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Studies of Pulmonary Findings and Antigen Sensitivity Among Student Nurses

V. Doubtful Reactions to Tuberculin and to Histoplasmin

By CARROLL E. PALMER, M. D., and O. STRANGE PETERSEN, M. A.*

One of the most difficult problems in many fields of science arises in connection with observations which are often called doubtful or questionable. This problem frequently arises in the medical sciences and is nowhere more strikingly evident than in the interpretation of various diagnostic cutaneous tests.

In observing and interpreting the results of cutaneous tests, reactions are observed which, because of their perceptual characteristics, seem to lie somewhere in-between those which appear to be definitely positive or definitely negative. The existence of such in-between reactions is sometimes denied by establishing rules of classification, often quite arbitrarily, which demand that each reaction be designated as either positive or negative. As those who have had much practical experience know, sharp lines of demarcation are difficult to follow. Many workers, recognizing the difficulty, attempt to solve it by setting up in-between or doubtful categories to which are allocated those observations which seem to be equivocal because of their perceptual characteristics. Such a procedure, while obviously failing to solve the basic problem, does focus attention on the fact that criteria for interpreting cutaneous reactions are not as yet wholly satisfactory.

It is apparent that both the quantitative and qualitative characteristics of reactions to most tests form a continuous scale—from large typical reactions to no perceptible reactions. The problem is further complicated since reactions are not always consistent or stable because of physiological factors associated with local cutaneous or general

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systemic variables within the individual being tested. In addition, mechanical factors in making tests and observing reactions probably produce considerable variation. The existence of false or nonspecific reactions from other causes may well represent another very significant and disturbing element in the interpretation of reactions. The presence of all these factors—the gradual shading of discernible characteristics from one end of the scale to the other, some degree of physiological variation, a sizable experimental error, and nonspecific reactions—provides ample explanation of the difficulty of dividing cutaneous reactions into positive and negative groups.

The efficiency of a diagnostic test cannot be judged primarily in terms of the physical characteristics of reactions or the ease with which they are perceived or read, even though these are practical matters of considerable importance. The only way to distinguish positive from negative reactions is in terms of the relationship of the reactions to pertinent facts or factors quite independent of any characteristics of the reactions themselves. Measurement of the efficiency of a cutaneous test rests, therefore, upon the correlation which may be shown to exist between various classes of reactions and the specific diagnostic fact that the test is presumed to indicate. For example, the efficiency of the tuberculin test is often expressed in terms of the correlation between tuberculin reactions and an index or indices of infection.

Studies on criteria for interpreting cutaneous tests actually become, then, a matter of studying the whole range of reactions to determine where, along a continuous scale, the most significant separation can be made between positive and negative reactions. Theoretically, the objective is to find a point on the scale, above which all or nearly all reactions can be regarded as positive and below which nearly all can be regarded as negative. In practical work, the point tends to become an interval on the scale, a category of reactions where a major transition in interpretation takes place. That whole category of reactions may be considered as doubtful entirely on the basis of the fact that they are doubtful or equivocal, with respect to their interpretation. In other words, such a class of reactions must be considered equivocal purely because of the doubt regarding their meaning not because of uncertainties regarding their physical characteristics.

It is apparent therefore that there are two quite separate and distinct ways of defining doubtful reactions—one on the basis of equivocal appearances, the other on the basis of equivocal interpretations. For any specific test, these two classes of reactions may or may not coincide.

An opportunity to study doubtful reactions and to examine present criteria of interpreting tuberculin and histoplasmin reactions is afforded in material from an extensive study of tuberculosis in student nurses. Several reports bearing on criteria of interpreting reactions have been published from that investigation. In part IV of the series, a preliminary consideration is given specifically to questions of doubtful reactions. The present study is a continuation of that analysis, based on the same data. In the main, however, this report must also be considered as preliminary, essentially only an illustration of a method of analysis.

Methods and Hypotheses

Although the above is a general statement of our perspective on judging cutaneous reactions, definitive analysis requires a much more rigorous formulation of basic conditions and assumptions. To express these matters in explicit terms involves the risk of oversimplification of many aspects of a very complex problem. Nevertheless, we have attempted to define terms, to formulate certain simple hypotheses, and then to illustrate some of the more pertinent consequences. Other hypotheses might be proposed and the rather simple formulation presented here aims only at an explanation of certain major issues and reserves for later consideration such elaborations as would be required to explain many of the complex problems of interpreting cutaneous reactions.

It is assumed, first of all, that the fundamental objective of a diagnostic test is to furnish a technique for separating a population into two groups: for the tuberculin test, for example, into those infected and those not infected with the tubercle bacillus. By definition, the former are designated as *true positive reactors*, the latter as *true negative reactors*.

In actual practice the tests do not divide a population only into two groups. In some respects the tests do more, and no special question is raised by the fact that they permit the further subdivision of positive reactions into different degrees or classes of positivity. For negative reactions, the fact is not so commonly considered but there can be no question that the test reveals similar classes or degrees of negativity.

The idea that one point divides the scale into positive and negative reactions implies that the former are distributed continuously over a part of the scale ending abruptly at a certain point; that the latter are distributed continuously over another part of the scale ending abruptly at a certain point; and that these two points coincide. On both theoretical and practical grounds, this theory appears untenable; it does, however, lead to a simple hypothesis of erroneous classification which is proposed as the central thesis of the present paper: Positive and negative reactions are distributed continuously over a quantitative reaction scale but in such a way that the two distributions overlap to a smaller or larger extent. It is explicitly assumed in this connection that positive and negative reactions cannot be distinguished by the perceptual characteristics of the reactions themselves. As a consequence, any observed distribution of reactions represents a composite one, made up of the addition of the two hypothetical distributions.

If the variations in reactions were mainly caused by experimental errors, the two distributions could, with a uniform testing and reading technique, be assumed to be stable.

The variations in reactions are presumably due, not only to experimental errors, but also to physiological variability of sensitivity. However, if the conditions underlying such physiological variations could be assumed constant, we would still expect the two separate distributions to be very much the same in different populations, for example, in different geographic areas.

Since we assume that the distributions of true positive and true negative reactions overlap, the number of persons showing reactions represented by a certain interval of the scale will consequently consist of a constant proportion of the true positives and another constant proportion of the true negatives. If the overlapping can be regarded, at least from a practical point of view, as taking place only on part of the scale, the scale can be divided into three intervals corresponding to a classification frequently used in current practice. Thus the scale would separate into three classes: (1) Definite reactions, representing

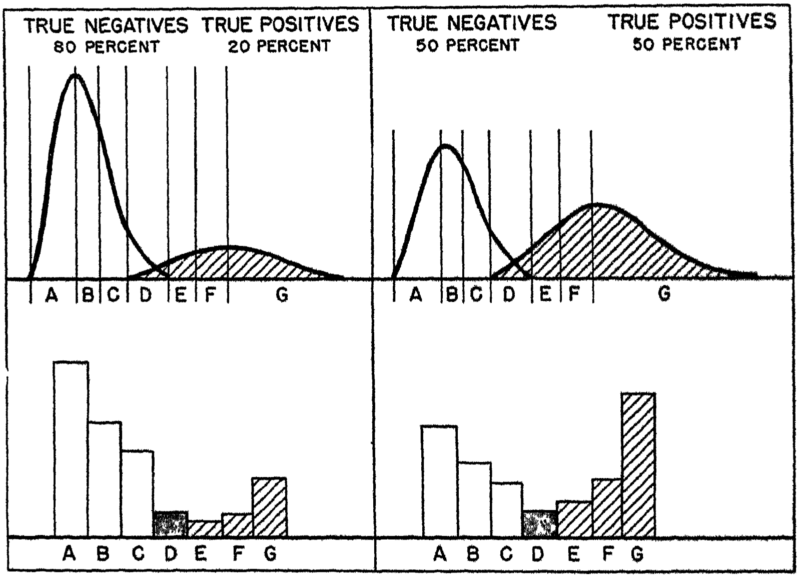

Figure 1. Hypothetical distributions of true negative and true positive reactions and corresponding histograms for different levels of prevalence of true positive reactions, when $\alpha=\beta$.

only true positives; (2) doubtful reactions, representing a constant proportion of the true positives and a constant proportion of the true negatives; (3) no reactions, representing only true negatives.

To express the relations in symbols, let a population consist of true positives in the proportion p, and true negatives in the proportion q, $(p+q=1)$. Then we would expect to find:

a relative frequency of definite reactions

$$x=(1-\alpha)p$$

a relative frequency of doubtful reactions

$$z=\alpha p+\beta q$$

and a relative frequency of no reactions

$$y=(1-\beta)q$$

α and β being the proportions of true positives and true negatives, respectively, classified as doubtful.

According to this formulation of the problem, the doubtful will be a proportion of the total number tested, that proportion being constant if $\alpha=\beta$, increasing if $\alpha>\beta$, and decreasing if $\alpha<\beta$, with increasing prevalence of true positives (p). The proportion of doubtfuls that are true positives which will increase with increase of p, can be expressed as:

$$\frac{\alpha p}{\alpha p+\beta q}=\frac{\alpha p}{\beta+(\alpha-\beta)p}$$

To demonstrate the implications of the hypothesis, two schematic examples are shown in figure 1. The two hypothetical distributions of reactions for true negatives and true positives, respectively, are drawn as smooth curves to a scale representing the degrees of reaction. This scale has been divided by arbitrary vertical lines into sections labelled A, B, C, etc., corresponding to degrees of reaction sometimes used in practical work. Throughout this example the same two distributions are used, but they have been drawn to illustrate different levels of prevalence of true positives. In the lefthand section, the hypothetical distributions were drawn in accordance with a prevalence of positive reactors equal to 20 percent of the total population, that is, the area under the smooth curve representing negatives is four times as large as the area occupied by the positives. In the righthand section of the figure, a prevalence of 50 percent was assumed and the areas under the two hypothetical curves are equal. The histograms placed below the smooth curves are constructed by combining the two hypothetical distributions of true positives and true negatives. They correspond with composite distributions such as are found when actual obser-

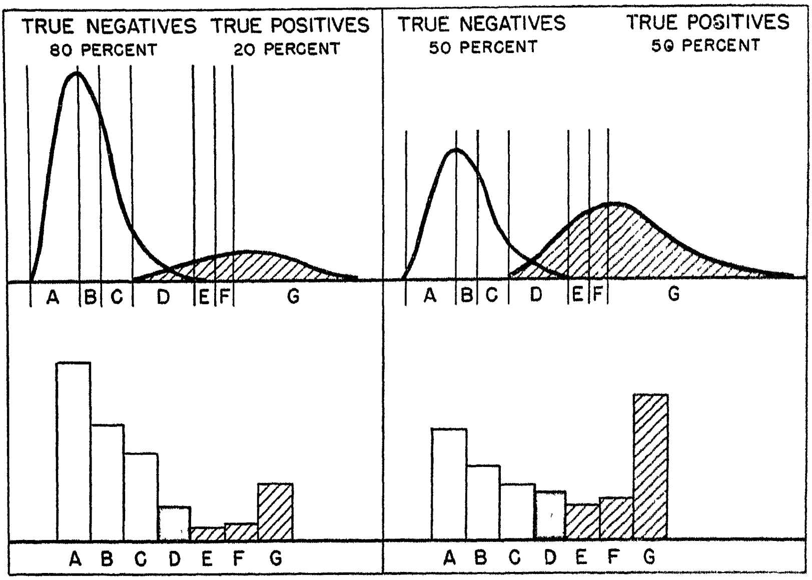

Figure 2. Hypothetical distributions of true negative and true positive reactions and corresponding histograms, for different levels of prevalence of true positive reactions, when $\alpha > \beta$.

vations are classified. An interval on the scale representing doubtful reactions was chosen in such a way as to cut off equal proportions of both distributions, that is, under the special condition as formulated above when $\alpha=\beta$. Comparison of the two histograms illustrates that under this special condition, the number of doubtful reactions remain in the same proportion to the total population, even though the form of the observed distribution changes with varying prevalence of positive reactions.

Figure 2 has been prepared in exactly the same way, except that the range defined as doubtful was shifted to include a higher percentage of the positive reactions than of the negative, that is, under the condition in which $\alpha>\beta$. This is an example of how the frequency of doubtful reactions will increase with the prevalence of positive reactions.

In the simple form the hypothesis of erroneous classification applies only to populations with a constant distribution of degrees of reactions among true positives and with another constant distribution among true negatives. That such populations do exist seems to be confirmed by observations from a number of city areas (see the following section). On the other hand, the possibility should not be excluded that the distributions, in level and pattern of degrees of reaction, could vary from one area to another, for the true positives as well as for the true negatives.

In this connection, the possible existence of nonspecific reactions

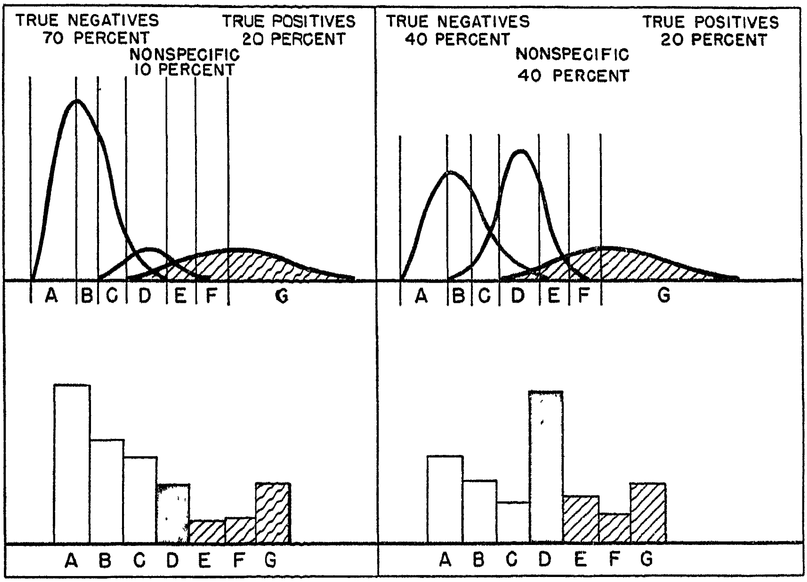

Figure 3. Hypothetical distributions of true negative, nonspecific, and true positive reactions, and corresponding histograms, for different levels of prevalence of nonspecific reactions.

deserves special attention. In a population in which a certain number of persons had developed a nonspecific sensitivity to the antigen in question, the simple approach might fail or rather be insufficient. The basic idea of overlapping distributions, however, could still be a useful tool, for the general principle is easily expanded to a case where a distinction is made among three different overlapping distributions: true negatives, true positives, and nonspecific reactions. Figure 3 schematically illustrates two situations, one in which 10 percent of the total population exhibits nonspecific reactions, the other, 40 percent.

In drawing the graphs it was assumed that the distribution of nonspecific reactions, according to degree of reaction, is distinctly different from those of true negatives and those of true positives, so that they would fall in the middle part of the scale somewhere between typical negatives and positives. In this case, the shape of the observed distribution may be markedly distorted from a U-shape to a trimodal curve as illustrated by the right-hand section of figure 3.

This situation would be readily recognized in actual observations, but the effect of an added group of nonspecific reactions would be much less obvious if the group were small, as illustrated in the left-hand section of figure 3, or if its distribution according to degree of reaction were more similar to either that of the true negatives or that of the true positives. In case, for example, the nonspecific reactions had exactly the same distribution as the specific (true) reactions, the

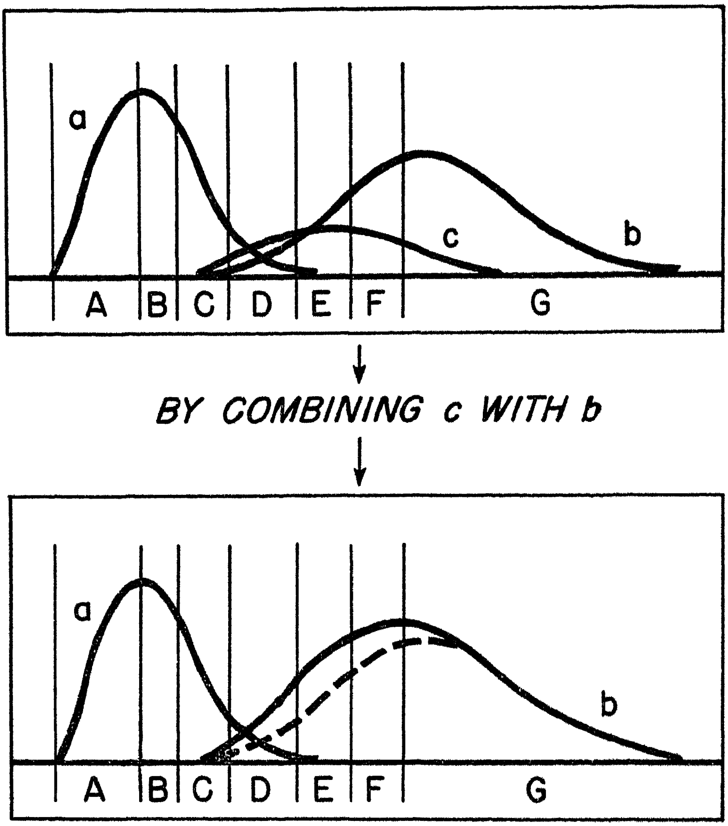

Figure 4. Hypothetical distributions of true negative, nonspecific, and true positive reactions.

skin test could contribute nothing to a division. However, if the nonspecific reactions were, for example, somewhat less marked on an average than the true reactions, a situation would arise where statistical investigation might still disclose the existence of nonspecific reactions. In such a circumstance, the simplest approach may be to conceive of two overlapping distributions, one of which would be composed of both specific and nonspecific reactors as illustrated in figure 4, which shows how the two distributions, positive and nonspecific, are combined into one.

Compared with a population otherwise similar but with no nonspecific reactors, this situation would be characterized by a shift or displacement of the distribution of positives (since these would now include the nonspecific). One consequence of this would be that a higher percentage of the positives would be registered as doubtful. An analogous situation would arise if, for example, a nonspecific factor created a very low degree of sensitivity. In this case the distribution curve of the negative reactors would appear to shift to the right and a higher proportion of the negatives would be classified as doubtful. Both situations are conceivable, and both could be recognized in practical research through statistical comparisons between different groups of persons, geographically or otherwise.

It would not be possible, of course, by this approach alone to establish the existence of nonspecific infection, but shifts in distributions would call for some explanation. Changes in the form of the observed distributions of the types shown in figures 3 and 4 could be explained by the existence of nonspecific allergy; but they might also be explained by other theories, for example, by different degrees or types of infections with the same organism.

The basic principle discussed in this section, however, is not necessarily combined with any definite theory of the nature of different degrees of reactions. Starting from the simple notion of overlapping distributions, its justification as a promising foundation for analysis of observations must be the assumption that each of the distributions remains constant under certain circumstances. This would permit the setting up of a normal pattern, which might in many cases be sufficient to explain the main characteristics of observed material. At the same time, this normal pattern could serve as a standard of comparison and thus be useful in locating exceptional distributions.

The general hypothesis was formulated as a tool for interpreting certain problems which arose in the nurses study, and the following sections will illustrate its application in a preliminary way.

Material

The fourth report in the series from the nurses study deals primarily with the relationship between pulmonary calcification and sensitivity to tuberculin and histoplasmin. It contains a detailed description of the plan, scope, and procedures of the study. In addition, it furnishes extensive tabulations of the results of tuberculin and histoplasmin tests and X-ray examinations of over 16,000 nurses from 11 widely separated metropolitan centers in the United States. The only descriptive material and tabulations given here will be those especially needed for this presentation. For a better understanding of the present discussion, the reader is referred to the previous report.

Basic numerical tabulations which are used for this analysis are given in the appendix. The left-hand section of the table shows the number of student nurses cross-tabulated according to their reactions to both tuberculin and histoplasmin. The right-hand section gives a similar cross-tabulation for those nurses whose chest X-ray film showed the presence of pulmonary calcification. Both tuberculin and histoplasmin reactions are classified into 7 groups. The data are given separately for each of the 11 metropolitan areas as well as for the total group of 16,320 student nurses.

Certain details regarding the cutaneous tests are essential for this discussion. Only one dose of histoplasmin of a 1/1000 dilution of stock antigen was given. With respect to tuberculin, two doses of PPD-S were used: the first usually being 0.0001 mg.; the second, 0.005 mg. The second dose was given when less than 10 mm. of firm induration was observed as the reaction to the preliminary dose. Tests with both antigens were intradermal—made on the volar surface of the forearm, using 1/10 cc. of solution. Reactions were usually read at 48 hours; the widest transverse diameter of erythema and of induration and a qualitative description of the character of induration were recorded. Although the nurses were routinely tested at 6-month intervals, the only observations tabulated here are those for the first tuberculin and first histoplasmin test. In a high proportion of cases, these first tests were made at the time the nurses entered training. With respect to several variables, the population under study was very homogeneous: all were student nurses, all were female, 80 percent were between 20 and 22 years of age, and an estimated 99 percent or more were white.

Because of the uses made of the records in this study, it is of the utmost importance to state that over 95 percent of all of the reactions were read by only two persons and more than two-thirds of them by only one person. The uniformity thus obtained is highly important to the present analysis in which the experimental error has been assumed to be constant.

The measurements of the diameter of erythema and induration are similar to those ordinarily made of tuberculin and histoplasmin reactions. The qualitative description of the induration, however, was developed especially for the study of the student nurses. Four categories are used to classify all indurations measuring 5 or more mm. in diameter. The numeral I is used to describe a typical textbook reaction with an area of induration which is firm, elevated, clearly defined, and well circumscribed. At the other end of the scale, IV is used to describe a questionable induration which is soft, ill-defined, and not well circumscribed. Numerals II and III are used to describe reactions which do not entirely fulfill the conditions for either I or IV, but fall somewhere between the two; II denotes the reaction showing greater similarity to that described as I, and III, showing greater similarity to IV.

Through the use of these descriptive designations and the measurements of erythema and induration, each histoplasmin and tuberculin reaction was classified into one of seven categories. Since histoplasmin tests were done with one dose and tuberculin tests with two doses, two different schemes of classifications were used. For purposes of tabulation the various categories are labeled arbitrarily by letters of the alphabet arranged to obtain a graduated scale of the level or degree of reaction to histoplasmin and to tuberculin, expressed in terms of size and intensity of the reactions.

The categories for histoplasmin are:

A—Reactors with induration of 10 or more mm., described as I.
B—Reactors with induration of 10 or more mm., described as II.
C—Reactors with induration of 5–9 mm., described as I or II, or of 5 or more mm., described as III.
D—Reactors with induration of 5 or more mm., described as IV.
E—Reactors with small undescribed induration.
F—Reactors with erythema only of 5 or more mm.
O—Nonreactors or those with only erythema of less than 5 mm.

The categories for tuberculin are:

G—Reactors with induration of 10 or more mm. to 0.0001 mg., described as I.
H—Reactors with induration of 10 or more mm. to 0.0001 mg., described as II.
I—Reactors with induration of 5–9 mm. to 0.0001 mg., described as I or II, or of 5 or more mm., described as III.
J—Reactors with induration of 10 or more mm. to 0.005 mg., described as I or II.

K—Essentially nonreactors with induration of less than 10 mm. to 0.005 mg., described as I or II, or induration, described as III or IV.

L—Essentially nonreactors with erythema only of 10 or more mm. to 0.005 mg.

O—Nonreactors or those with erythema only of less than 10 mm. to 0.005 mg.

Both scales can be taken as rough indices of the degree of reaction. In neither case is the scale strictly quantitative, since it is based on the character of the reaction as well as on measurement. Further, the two scales are fundamentally different in that the intermediate grades on the histoplasmin scale represent minor reactions to a given dose, but on the tuberculin scale include very substantial reactions to a large dose of antigen. In spite of this difference it seems permissible to interpret the two scales in very much the same way, letting the extreme ranges of the scales stand for definite reactions or no reactions, respectively, and a certain central part of the scale correspond to the equivocal reactions.

This implies that different levels of sensitivity could be established either by measuring the size of reaction to a given dose, or by determining the minimum dose necessary to produce a given reaction. We have not hesitated, therefore, in applying the same interpretation to both scales on the assumption that both represent an approximately correct distribution of reactions on a continuous quantitative reaction scale from unequivocally positive through equivocally positive or negative, to unequivocally negative.

On the other hand, it is evident that the classification of reactions into the groups defined above is largely arbitrary, and that a further element of arbitrariness is introduced if the distributions are simplified by designating a certain range to cover the doubtful reactions.

In the previous study it was found expedient to designate as doubtful those reactions to histoplasmin of the types described as D, E, and F, while A, B, and C were considered definite, and O was used as the definition of no reaction. For tuberculin reactions a similar broad distribution was applied, including four categories: definite reactors, G, H, and I; questionable reactors, J; essentially nonreactors, K and L; and nonreactors, O. These broader groupings, as well as the more detailed classifications described above and given in the appendix, are used in this study.

In this connection it may be pointed out that the terms used to designate the broad groups, especially those for tuberculin reactions, do not closely follow current practices. The category J of questionable tuberculin reactions would ordinarily be considered from physical characteristics as strong positive second-dose reactions; and many of those in the essentially nonreactors groups K, and L would be considered as positive reactors by most workers. The doubtful group of histoplasmin reactors as defined here would have been considered as negative by most workers. However, doubtful or questionable, as used here and in the earlier paper, indicates that the interpretation of the reactions is equivocal, as determined through the use of pulmonary calcification as an index of infection.

Doubtful Reactions to Histoplasmin

In paper IV of the series, it was shown that the frequency of definite reactors to histoplasmin in the student nurses varies greatly in the 11 cities, from a high of nearly 60 percent in Kansas City to a low of less than 5 percent in Minneapolis. In addition, it was found that the frequency of reactions classified as doubtful also varies. A preliminary analysis of this latter variation included in the previous report was carried only to the point of indicating that, in general, relatively more doubtful reactors were found in cities of high than in cities of low prevalence of sensitivity to histoplasmin. Further study, however, resulted in the formulation of the rather simple hypothesis of erroneous classification given above.

A test of the hypothesis on observed data may be made by attempting to determine whether the frequency of doubtful reactors among nurses in the different cities is approximately what it would be if a certain percentage of true positives and a certain percentage of true negatives had been misclassified as doubtful. The initial step is to estimate what these two percentages might be, and to do this a simple graphic analysis was applied.

As above, let the proportion of true positive reactors in a population be p, and the proportion of true negatives be $q=1-p$ and assume that the fraction α of the positives and the fraction β of the negatives are classified as doubtful. The relation between the expected proportion of definite reactions, x, and of no reactions, y, found in any population can then be expressed as the linear equation:

$$y=(1-\beta)-\frac{1-\beta}{1-\alpha}x$$

the graph of which is a straight line intercepting the x-axis at the point $1-\alpha$ and the y-axis at $1-\beta$. From the findings of the 11 cities shown in table 1, the percentages of nonreactors were plotted against percentages of definite reactors and a straight line was visually fitted to the points, as shown in figure 5. The values of α and β were then immediately determined to be .09 and .02, respectively. More refined methods of graduation could be considered, of course, but it was decided that very great precision could not be expected and that

Table. 1. *Number of student nurses tested with histoplasmin in specified cities and percentage classified as definite, doubtful, and nonreactors*

City	Number of nurses tested	Percentage			
		Definite reactors (A, B, C)[1]	Doubtful reactors (D, E, F)[1]	Non-reactors (O)[1]	Total
Kansas City, Mo.	1, 131	57. 7	7. 1	35. 2	100. 0
Columbus, Ohio	1, 330	55. 6	4. 9	39. 5	100. 0
Kansas City, Kans.	532	45. 3	5. 8	48. 9	100. 0
New Orleans	1, 290	21. 2	7. 2	71. 6	100. 0
Baltimore	1, 971	22. 0	3. 3	74. 7	100. 0
Detroit	1, 250	12. 6	1. 7	85. 7	100. 0
Los Angeles	1, 778	10. 6	3. 7	85. 7	100. 0
Philadelphia	2, 179	10. 5	3. 2	86. 3	100. 0
San Francisco	1, 111	7. 0	2. 7	90. 3	100. 0
Denver	1, 329	6. 6	1. 8	91. 6	100. 0
Minneapolis	2, 419	4. 2	2. 7	93. 1	100. 0
All cities	16, 320	19. 5	3. 7	76. 8	100. 0

[1] See text for description of classifications.

the simple visual method of fitting the line would be sufficient for present purposes.

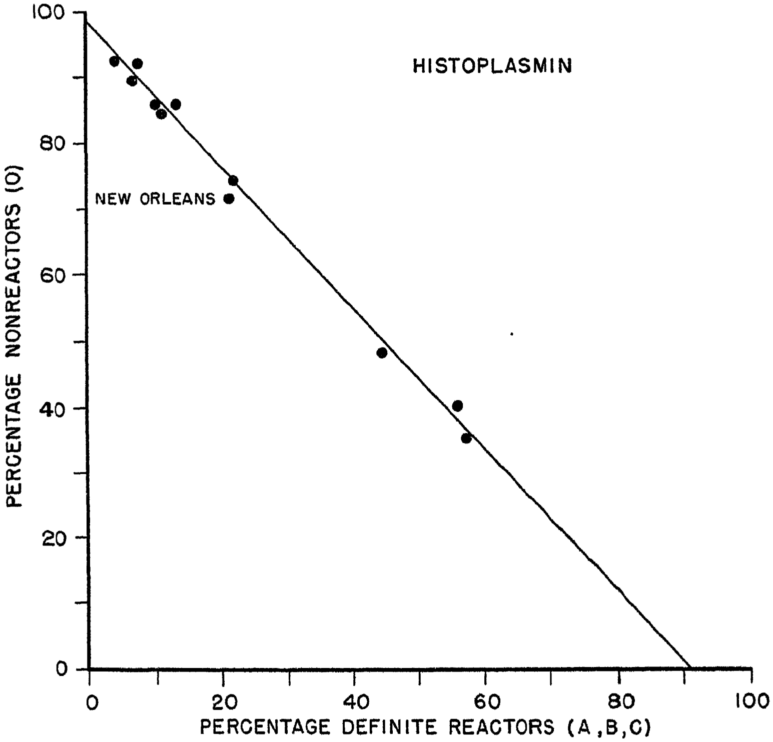

Figure 5. Graphical fitting of the straight line $y=(1-\beta)-\frac{1-\beta}{1-\alpha}x$, where x and y are the proportions of definite and nonreactors to histoplasmin, respectively, among student nurses tested in 11 cities. Each point represents a city.

Thus it is estimated that approximately 9 percent of the true positive reactors and approximately 2 percent of the true negative reactors are erroneously classified as doubtful. Thus, in a population with a prevalence of true positives of p, the expected distribution of readings would be:

definite reactions $x=.91\ p$
no reactions $y=.98\ (1-p)$
doubtful reactions $z=.09\ p+.02\ (1-p)=.02+.07p$

where obviously $x+y+z=1$.

From these results, table 2 was prepared to show, for various values of p, the estimated or hypothetical distributions of histoplasmin reactions. In an area with a prevalence of $p=.10$, for example, we find that 2.7 percent of the population would be classified as doubtful but if the prevalence were .60 we should expect 6.2 percent. Table 2 also shows the change in percentage of true positives expected

Table 2. *Hypothetical distributions*[1] *of histoplasmin reactors and the frequencies of true positives among doubtful reactors at different levels of prevalence of true positive reactors in the population*

Prevalence of true positive reactors	Percentage					
	Definite reactors	Doubtful reactors			Non-reactors	True positives among doubtful reactors
		Positives	Negatives	Total		
0	0.0	0.0	2.0	2.0	98.0	0.0
5	4.6	.4	1.9	2 3	93.1	19.1
10	9.1	.9	1.8	2.7	88.2	33.3
15	13.6	1.4	1.7	3.1	83.3	44.3
20	18.2	1.8	1.6	3.4	78.4	52.9
25	22.8	2.2	1.5	3.7	73.5	60.0
30	27.3	2.7	1.4	4.1	68.6	65.9
35	31.8	3.2	1.3	4.5	63.7	70.8
40	36.4	3.6	1.2	4.8	58.8	75.0
45	41.0	4.0	1.1	5.1	53.9	78.6
50	45.5	4.5	1.0	5.5	49.0	81.8
55	50.0	5.0	.9	5.9	44.1	84.6
60	54.6	5.4	.8	6.2	39.2	87.1
65	59.2	5.8	.7	6.5	34.3	89.3
70	63 7	6.3	.6	6.9	29.4	91.3
75	68.2	6.8	.5	7.3	24.5	93.1
80	72.8	7.2	.4	7.6	19.6	94.7
85	77.4	7.6	.3	7.9	14.7	96.2
90	81.9	8.1	.2	8.3	9.8	97.6
95	86.4	8.6	.1	8.7	4.9	98.8
100	91.0	9.0	.0	9.0	.0	100.0

[1] Assuming that 9 percent of true positives and 2 percent of true negatives are classified as doubtfuls.

among the doubtfuls, with change in the prevalence of true positives. When $p=.10$ only one third of the 2.7 percent classified as doubtful would be true positives, while when $p=.60$, nearly 90 percent of the 6.2 percent classified as doubtful would be true positives.

Figure 6 illustrates the hypothetical distribution graphically, the shaded area showing the proportion of true positives, the unshaded area the proportion of true negatives, and the area between the two lines showing the true positives and true negatives erroneously classified by observation as doubtful.

The prevalence of true positives cannot be found by direct observation, of course, but it can be estimated in accordance with the hypothesis, and such estimates were made for the nurses in the different cities, as shown in table 3. The estimates were obtained by a somewhat crude method which was considered sufficiently accurate. They are simple unweighted averages of two different estimates, one found by dividing the observed percentage of definite reactors in the city by $1-\alpha=0.91$, the other as 100 minus the percentage of nonreactors divided by $1-\beta=0.98$.

The data given in tables 1 and 3 now permit a comparison of observed frequencies of doubtful reactors and those which would be expected under our hypothesis. This is done in two ways: Table 4 shows the absolute observed and expected numbers, and figure 7

Table 3. *Estimated prevalence of true positive reactors among student nurses tested with histoplasmin in specified cities, expected distributions of reactors, and estimated frequencies of true positives among doubtful reactors*

City	Percentage				
	Estimated prevalence of true positive reactors	Definite reactors	Doubtful reactors	Nonreactors	Estimated true positives among doubtful reactors
Kansas City, Mo.	63.8	58.1	6.4	35.5	89.1
Columbus, Ohio	60.4	55.0	6.2	38.8	87.1
Kansas City, Kans	50.0	45.5	5.5	49.0	81.8
New Orleans	25.1	22.8	3.8	73.4	60.5
Baltimore	24.0	21.8	3.7	74.5	59.5
Detroit	13.2	12.0	2.9	85.1	41.4
Los Angeles	12.1	11.0	2.9	86.1	37.9
Philadelphia	11.7	10.6	2.9	86.5	37.9
San Francisco	7.8	7.1	2.5	90.4	28.0
Denver	6.9	6.3	2.5	91.2	24.0
Minneapolis	4.8	4.4	2.3	93.3	17.4
All cities	21.5	19.6	3.5	76.9	54.3

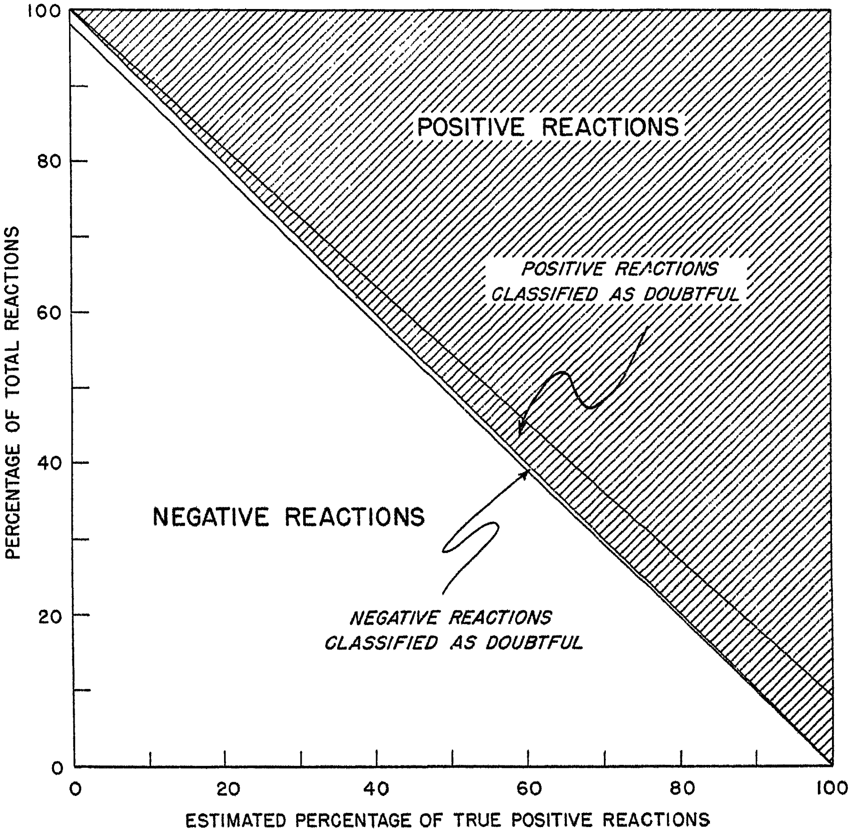

Figure 6. Hypothetical distribution of histoplasmin reactions. The center diagonal line represents the separation of true positive reactions and true negative reactions. The two outer diagonal lines enclose the hypothetical distribution for doubtfuls.

Table 4. *Number of student nurses tested and observed and expected number of definite, doubtful, and nonreactors to histoplasmin in specified cities*

City	Number						
	Nurses tested	Definite reactors		Doubtful reactors		Nonreactors	
		Observed	Expected	Observed	Expected	Observed	Expected
Kansas City, Mo	1, 131	653	657	80	72	398	402
Columbus, Ohio	1, 330	740	732	65	82	525	516
Kansas City, Kans	532	241	242	31	29	260	261
New Orleans	1, 290	273	294	93	49	924	947
Baltimore	1, 971	434	430	65	73	1, 472	1, 468
Detroit	1, 250	158	150	21	36	1, 071	1, 064
Los Angeles	1, 778	189	196	65	51	1, 524	1, 531
Philadelphia	2, 179	228	231	71	63	1, 880	1, 885
San Francisco	1, 111	78	79	30	28	1, 003	1, 004
Denver	1, 329	88	84	24	33	1, 217	1, 212
Minneapolis	2, 419	101	106	65	56	2, 253	2, 257
All cities	16, 320	3, 183	3, 201	610	572	12, 527	12, 547
All cities, except New Orleans	15, 030	2, 910	2, 907	517	523	11.603	11, 600

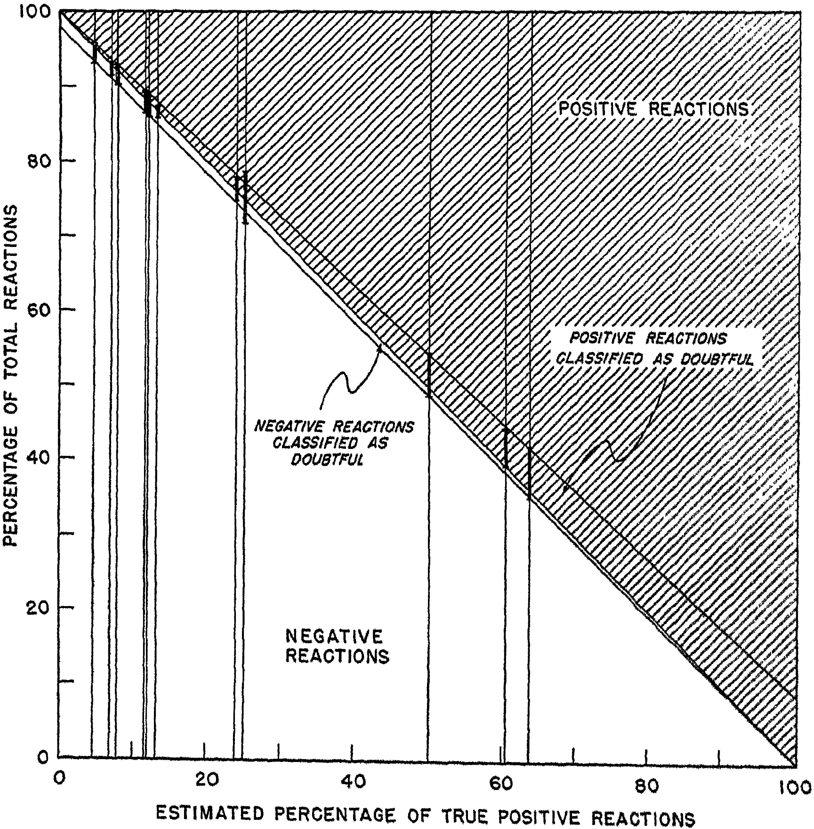

Figure 7. Observed histoplasmin reactions for 11 cities superimposed on hypothetical distribution of reactions. Vertical lines are placed on horizontal axis at estimated percentage of true positive reactions for each city; heavy segment of each vertical line indicates percent of observed doubtful reactions.

gives a graphic comparison of the distributions. From the table it appears that with the exception of New Orleans there is fairly close agreement between observed and expected numbers of doubtful reactors.

In figure 7 the observed frequencies for the 11 cities are superimposed on the hypothetical distribution as illustrated in figure 6. Each vertical line represents the subdivision of histoplasmin reactors into the definite, doubtful, and nonreactor categories, the position of the line on the horizontal axis being determined by the estimated prevalence of true positives for the city.

The reasonably close agreement between theory and findings is again brought out in figure 7. Here and in table 4, it appears that the distribution of reactions in New Orleans nurses follows a pattern somewhat different from that observed in nurses in the other cities. Because the deviation is so great, it would seem appropriate to give this city separate consideration. In the following section it will be shown that, with respect to tuberculin sensitivity also, the observations from New Orleans deviate very strikingly from the findings in the other cities.

Special attention should be given to one of the important implications of the theoretical interpretation of doubtful histoplasmin reactions. If, in the nurses study, 9 percent of the true positives and 2 percent of the true negatives are classified as doubtful reactors, this group will be composed very differently in areas with high and low prevalence of histoplasmin sensitivity. The right-hand column of table 3 shows the proportions of the doubtful groups in each city estimated to be true positive reactors. In Kansas City, Missouri, for example, where there is the highest prevalence of sensitivity to histoplasmin, nearly 90 percent of the nurses classified as doubtful reactors would be expected, according to the theory, to be true positives. In Minneapolis, where the prevalence of sensitivity is the lowest observed (about 5 percent), less than 20 percent of the doubtfuls are presumed to be true positives. The consequence of this difference in the meaning to be attached to doubtful reactions could be expected to manifest itself in a variety of ways. And it is of considerable interest that the frequency of pulmonary calcification in the chest X-ray films of the nurses varies as would be expected if the hypothesis were correct. The data which bear on this matter are given in the previous report and will not be repeated here. However, the finding is quite unmistakable: In those cities which have the highest prevalance of histoplasmin reactors (Kansas City, Missouri, and Columbus), and where a very high proportion of the doubtful groups may be regarded, according to the theory, to be true positives, one finds very little difference in the frequency of pulmonary calcification for the definite and doubtful reactors to histoplasmin. In the cities with a low prevalence of histoplasmin reactors (San Francisco, Denver, and Minneapolis) the frequency of calcification is very much lower among the doubtfuls, tending to approach the low rate found among the nonreactors.

Questionable Reactions to Tuberculin

The interpretation of different classes of tuberculin reactions presents a problem similar to that of histoplasmin reactions. In the data from the nurses study, the intermediate classes of tuberculin reactions represent substantial reactions to a large dose of antigen (.005 mg. PPD) but are taken as evidence of a low degree of sensitivity comparable to slight reactions to a lower dose. In the previous study, the reactions classified as J were described as questionable while the higher grades were considered as definite and the lower grades as nonreactors or essentially nonreactors. The two latter groups are combined into one and the observations from the 11 cities shown in table 5 are analyzed by the method described above.

Table 5. *Number of student nurses tested with tuberculin in specified cities and percentage classified as definite, questionable, and nonreactors* [1]

City	Number of nurses tested	Percentage			
		Definite reactors (G, H, I) [2]	Questionable reactors (J) [2]	Non-reactors[1] (K, L, O) [2]	Total
Kansas City, Mo.	1,131	10.9	5.4	83.7	100.0
Columbus, Ohio	1,330	11.4	3.3	85.3	100.0
Kansas City, Kans.	532	13.7	7.7	78.6	100.0
New Orleans	1,290	13.3	14.3	72.4	100.0
Baltimore	1,971	17.9	5.7	76.4	100.0
Detroit	1,250	13.9	4.2	81.9	100.0
Los Angeles	1,778	18.7	5.0	76.3	100.0
Philadelphia	2,179	22.8	4.5	72.7	100.0
San Francisco	1,111	18.6	4.0	77.4	100.0
Denver	1,329	18.8	5.1	76.1	100.0
Minneapolis	2,419	7.9	3.1	80.0	100.0
All cities	16,320	15.5	5.3	79.2	100.0
All cities, except New Orleans	15,030	15.7	4.5	79.8	100.0

[1] Including essentially nonreactors.

[2] See text for description of classifications.

In contrast to the findings for histoplasmin, the frequency of questionable reactors to tuberculin does not appear to be correlated with the prevalence of reactors. On the contrary, the frequency seems to fluctuate around 5 percent, ranging without any obvious systematic tendency from 3.1 percent in Minneapolis to 7.7 percent in Kansas City, Kansas. There is one outstanding exception, New Orleans, where nearly 15 percent of all nurses tested were classified as questionable reactors. Leaving out this city, however, the hypothesis of erroneous classification would suggest that a little less than 5 percent of the true positive and about the same percentage of the true negative reactors had been classified as doubtful.

Since the range of tuberculin sensitivity in the different cities is much smaller than that of histoplasmin, the visual fitting of a line by the same method as applied in figure 5 to histoplasmin reactions is

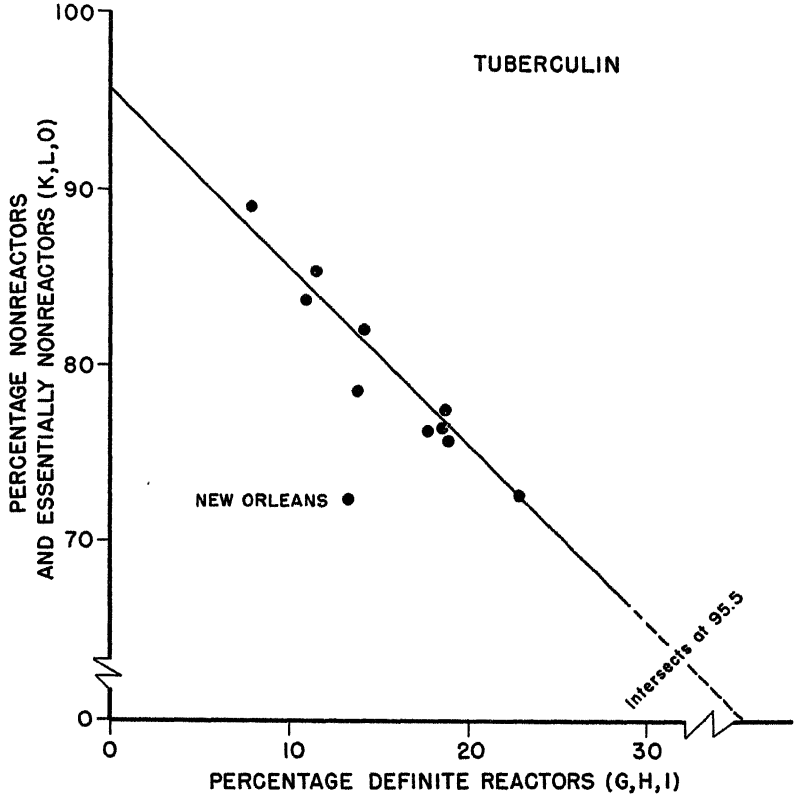

Figure 8. Fitting of the straight line $y=(1-\beta)-x$ where x is the proportion of definite reactors and y the proportion of nonreactors and essentially nonreactors to tuberculin among student nurses tested in 11 cities. Each point represents a city.

somewhat less reliable for tuberculin reactions. This would appear from figure 8 which is analogous to figure 5, but drawn to a larger scale. The straight line in figure 8, however, was drawn in accordance with the hypothesis that 4.5 percent of both positive and negative reactors were registered as questionable, 4.5 percent being the over-all frequency of questionable reactors in all cities except New Orleans. It appears that the line determined in this way gives a fair fit, except that it leaves the point representing New Orleans far out compared with the others. Although this variance is evidence of some distinctly different phenomenon in New Orleans, we shall at the moment omit a discussion of these factors and assume that in the 10 other cities the questionable reactors to tuberculin can be considered as a composite group comprising about 4.5 percent of the true positives and the true negatives in each city. The comparison between observed and hypothetical numbers shown in table 6, further demonstrates a fair

Table 6. *Number of student nurses tested and observed and expected number of definite, questionable, and nonreactors*[1] *to tuberculin in specified cities*

City	Number						
	Nurses tested	Definite reactors		Questionable reactors		Nonreactors[1]	
		Observed	Expected	Observed	Expected	Observed	Expected
Kansas City, Mo.	1,131	123	129	61	51	947	951
Columbus, Ohio	1,330	151	144	44	60	1,135	1,126
Kansas City, Kans.	532	73	81	41	24	418	427
New Orleans	1,290	171	234	185	58	931	998
Baltimore	1,971	353	365	112	89	1,506	1,517
Detroit	1,250	174	173	52	56	1,024	1,021
Los Angeles	1,778	333	336	88	80	1,357	1,362
Philadelphia	2,179	497	497	98	98	1,584	1,584
San Francisco	1,111	207	203	44	50	860	858
Denver	1,329	250	254	68	60	1,011	1,015
Minneapolis	2,419	192	177	74	109	2,153	2,133
All cities	16,320	2,524	2,593	867	735	12,929	12,992
All cities, except New Orleans	15,030	2,353	2,359	682	677	11,995	11,994

[1] Including essentially nonreactors.

correspondence, though the deviations appear to be larger than could be expected from random errors. However, there is no obvious evidence of systematic deviations.

As in the case of histoplasmin, the hypothesis implies that the proportion of true positives included among the questionable reactors will vary with the level of sensitivity, but since it is assumed that the same probability of misclassification applies to both negative and positive reactors, the same proportion of true positive reactors in the questionable group as in the total population would be expected. The proportion for each city was estimated from the observations by the same method as applied to histoplasmin. Table 7 shows the observed

Table 7. *Estimated prevalence of true positive reactors among student nurses tested with tuberculin in specified cities, expected distributions of reactors and estimated frequencies of true positives among questionable reactors*

City	Percentage				
	Estimated prevalence of true positive reactors	Definite reactors	Questionable reactors	Nonreactors[1]	Estimated true positives among questionable reactors
Kansas City, Mo.	11.9	11.4	4.5	84.1	11.9
Columbus, Ohio	11.3	10.8	4.5	84.7	11.3
Kansas City, Kans.	16.0	15.3	4.5	80.2	16.0
New Orleans	19.0	18.1	4.5	77.4	19.0
Baltimore	19.4	18.5	4.5	77.0	19.4
Detroit	14.4	13.8	4.5	81.7	14.4
Los Angeles	19.8	18.9	4.5	76.6	19.8
Philadelphia	23.9	22.8	4.5	72.7	23.9
San Francisco	19.2	18.3	4.5	77.2	19.2
Denver	20.0	19.1	4.5	76.4	20.0
Minneapolis	7.6	7.3	4.5	88.2	7.6
All cities	16.6	15.9	4.5	79.6	16.6
All cities, except New Orleans	16.4	15.7	4.5	79.8	16.4

[1] Including essentially nonreactors.

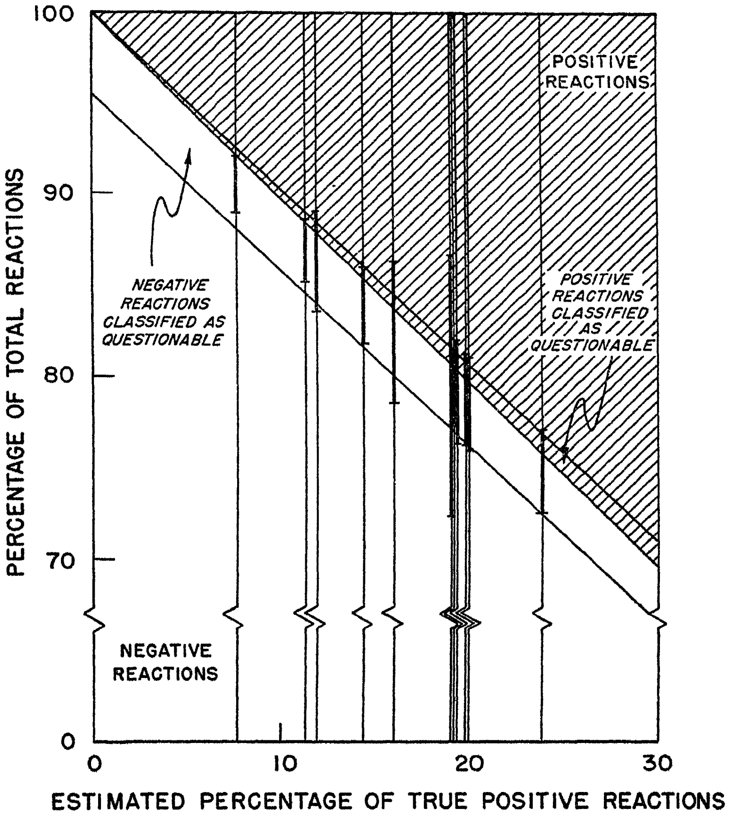

Figure 9. Observed tuberculin reactions for 11 cities superimposed on hypothetical distribution of reactions. Vertical lines are placed on horizontal axis at estimated percentage of true positive reactions for each city; heavy segment of each vertical line indicates percent of observed questionable reactions.

and expected numbers, and figure 9 gives a graphic comparison of the distributions analagous to that shown for histoplasmin in figure 7.

The validity of our hypothesis cannot easily be verified in terms of the frequency of pulmonary calcification in questionable tuberculin reactors because of the low rate of calcifications associated with tuberculin sensitivity and because of the small variations in prevalence of definite tuberculin reactions in the different cities. The available material can only be used to indicate the relationship for the total group of all nurses in all cities. Thus, among nurses with no reaction to histoplasmin, the results presented in the previous report (IV) show that 11.0 percent of those reacting definitely to tuberculin had pulmonary calcifications, as against only 1.8 percent for those classified as questionable tuberculin reactors and 0.7 percent for the nonreactors.[1] In accordance with the hypothesis, calcification would be expected at the rate of 0.7 percent in the 84 percent of the questionable reactors which are true negatives and at the rate of 11 percent of the

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[1] These figures do not agree entirely with those given in the earlier report because these quoted here are for all cities except New Orleans.

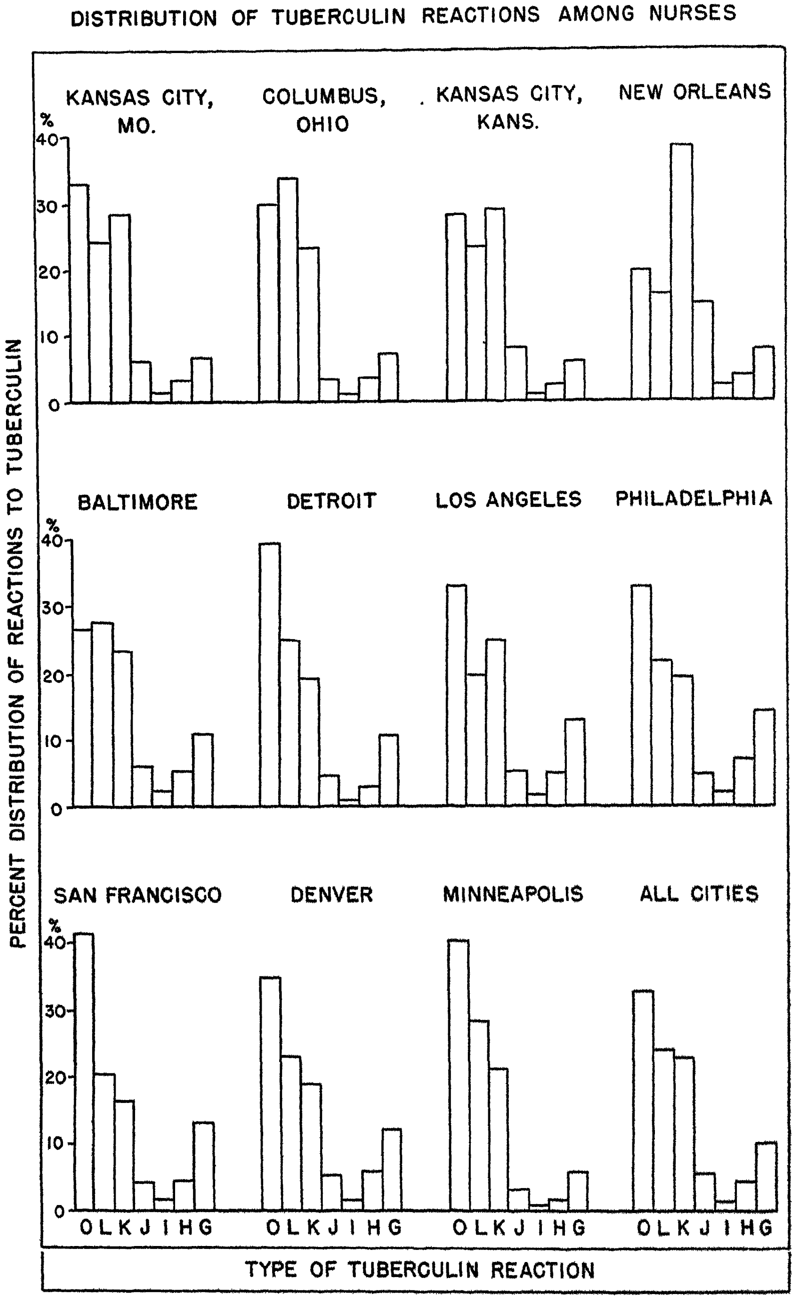

Figure 10. Distributions of student nurses tested in specified cities, according to tuberculin reaction.

remaining 16 percent which are true positives. This would equal 2.3 percent of the total group of questionable reactors, in reasonably close agreement with the actually observed frequency of 1.8 percent.

Although the hypothesis of erroneous classification seems to explain some of the less obvious results from the nurses study, it is clear that it does not explain everything. The fact that one of the 11 cities, New Orleans, differs so much from the others calls for supplementary consideration. In this connection, another step can be taken by examining the detailed classification of tuberculin reactions for each of the 11 cities, as shown in figure 10.

Careful inspection of figure 10 shows that five cities, Philadelphia, Denver, San Francisco, Detroit, and Minneapolis, have graphs of closely similar pattern, a fairly regular U-shaped curve with the modal frequency being the nonreactor in the O class. This form of curve is common to the five cities in spite of the varying frequency of definite tuberculin reactors, ranging from the lowest to the highest among the cities covered by the study. Compared with these, the graphs for Columbus and Baltimore show a conspicuous shift toward the right, the modal class being reactions classified as L. A further shift in the same direction is found in the graphs for Kansas City (both areas) and Los Angeles, where K reactions are more frequent. Finally, the distribution from New Orleans is evidently quite different. What appeared to be a gradual change in other cities is so pronounced in New Orleans that the distribution of tuberculin sensitivity exhibits a pattern with little resemblance to the usual U-shape. In New Orleans, an extraordinarily high percentage of the nurses reacted to the second dose of tuberculin and were classified as J or K, questionable reactors or essentially nonreactors. Certainly, for this city, the questionable reactors cannot be explained by random errors or considered merely a group of erroneously classified positive and negative reactors. The observations definitely indicate the existence of some unusual sensitivity to tuberculin. Corresponding with the hypothetical case illustrated in figure 3, the widespread existence in New Orleans of a nonspecific factor could produce sensitivity to high doses of tuberculin in such a way that the distribution of nonspecific reactions would be between those for true negative and true positive reactions, falling in that interval of the scale of reactions designated as questionable.

The same factor—or similar factors—may exist in the other cities but if so it is apparently of much less importance than in New Orleans. It is possible that the five cities with U-shaped distributions of tuberculin reactions of the same regular pattern, were practically free of the nonspecific sensitivity while some of the other cities had enough questionable reactions due to nonspecific sensitivity to influence the shape of the distribution.

The presumptive evidence presented here on the existence of nonspecific tuberculin reactions may be of great practical importance. The data clearly indicate that enormous variation in the percentage of so-called positive tuberculin reactions can be obtained by varying the criteria for interpreting reactions to the higher tuberculin test doses. Further, the extent of this variation is probably chiefly dependent upon geographic factors. For example, among New Orleans nurses at least as many as 40 percent, rather than 14 percent, could be designated as positive reactors by the use of criteria that are widely used in the United States today. Findings presented here suggest that this nearly threefold difference is due to the inclusion of nonspecific reactors in the higher estimate.

To speculate as to the cause of the nonspecific tuberculin sensitivity, it seems most likely that it is an infection with one or several organisms (perhaps of the alcohol-acid-fast variety) which, in effecting its (or their) own specific allergy, produces a cross sensitivity which may be brought out by the higher doses of tuberculin used in human testing.

Correlation Between Tuberculin and Histoplasmin Reactions

The analysis in the preceding sections, relatively crude as it has been, shows that the hypothesis of erroneous classification, even in its simplest form, offers a plausible and extremely simple explanation of certain findings which would not be easy to interpret in other terms.

Of the several factors which complicate the general application of the hypothesis, however, only one will be considered briefly: the evidence of a lack of independence of the reactions to tuberculin and histoplasmin. There is no substantial correlation or cross reaction, but unmistakable indication of some association. This appears from the two-dimensional distribution of the total 16,320 nurses according to the detailed classification of degrees of reaction to both antigens.

Table 8. *Expected distribution of student nurses tested and differences between observed and expected number according to histoplasmin and to tuberculin reaction—for all cities*

Tuberculin reaction [1]	Expected distribution of nurses tested								Difference between observed and expected number of nurses							
	Histoplasmin reaction [1]								Histoplasmin reaction [1]							
	A	B	C	D	E	F	O	Total	A	B	C	D	E	F	O	Total
G	140	79	68	20	20	20	1,287	1,634	20	0	13	2	10	10	−55	0
H	58	36	29	7	8	7	521	666	−11	7	6	4	9	0	−15	0
I	21	12	12	4	0	3	172	224	−5	3	1	2	9	2	−12	0
J	79	52	42	14	10	13	657	867	−4	−1	−2	−3	−3	−5	18	0
K	366	229	194	58	48	49	2,777	3.721	12	−32	9	−14	−1	7	19	0
L	393	228	186	54	46	44	2,943	3,894	−7	5	−12	1	−4	−3	20	0
O	464	264	231	63	62	60	4,170	5,314	−5	18	−15	8	−20	−11	25	0
Total	1,521	900	762	220	194	196	12,527	16,320	0	0	0	0	0	0	0	0

[1] See text for description of classifications.

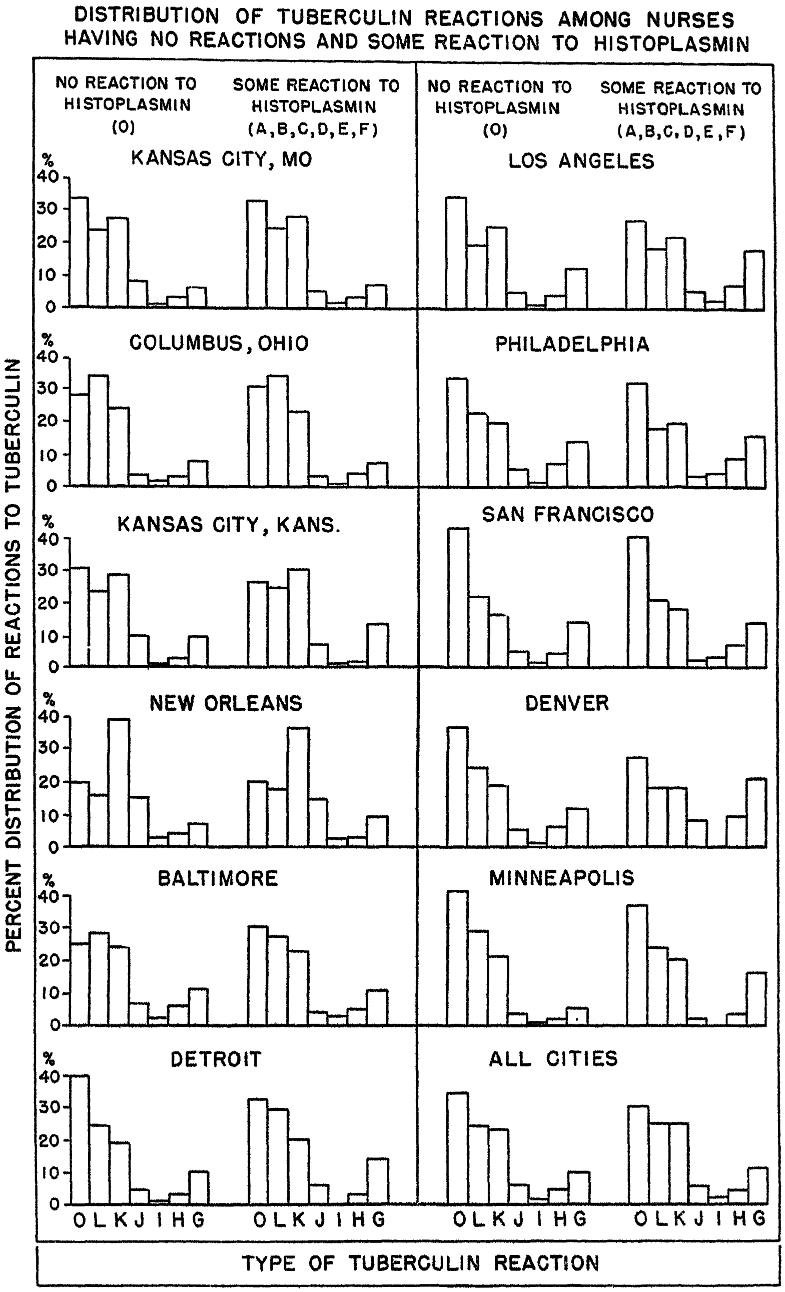

Figure 11. Distributions of student nurses tested in specified cities, according to tuberculin reaction, for nurses having some reaction and no reaction to histoplasmin, respectively.

The observed distribution is shown in the appendix; it should be compared with a hypothetical distribution computed under the assumption of independence of the two tests. Such distributions were computed for each city and added to give the expected distribution for all cities as shown in table 8. To facilitate the comparison, the differences between observed and expected frequencies are shown in another section of the same table.

In general, the deviation between observed and expected frequencies is not great, except for one section of the table - the upper middle part where the observed frequencies exceed the expected ones. Relatively more doubtful reactions to histoplasmin are found among the nurses with a strong reaction to tuberculin than among those with no reaction to tuberculin, or, conversely, there are more definite reactions to tuberculin among those who displayed some reaction to histoplasmin than among those who did not.

It would be desirable to divide the observations for each city according to the degree of reaction and to study the distribution of reactions to each test for each class of reactions to the other test. In spite of the large number of nurses examined, there is only enough material to make profitable a comparison between two groups for each test.

The distributions of tuberculin reactions were made separately for one group of nurses with definite and doubtful reactions to histoplasmin and another with no reaction. These two distributions are shown for each city in figure 11, from which it appears that tuberculin

Table 9. *Number of student nurses tested in specified cities and percentage classified as definite, questionable, and nonreactors [1] to tuberculin, for nonreactors and reactors [2] to histoplasmin, respectively*

City	Nonreactors to histoplasmin					Reactors [2] to histoplasmin				
	Number of nurses tested	Percentage				Number of nurses tested	Percentage			
		Definite reactors (G, H, I) [3]	Questionable reactors (J) [3]	Nonreactors [1] (K, L, O) [3]	Total		Definite reactors (G, H, I) [3]	Questionable reactors (J) [3]	Nonreactors [1] (K, L, O) [3]	Total
Kansas City, Mo	398	10.0	7.5	82.5	100.0	733	11.3	4.2	84.5	100.0
Columbus, Ohio	525	11.7	3.6	84.7	100.0	805	11.1	3.1	85.8	100.0
Kansas City, Kans	260	11.9	8.9	79.2	100.0	272	15.4	6.6	78.0	100.0
New Orleans	924	13.1	14.5	72.4	100.0	366	13.7	13.9	72.4	100.0
Baltimore	1,472	17.9	6.4	75.7	100.0	499	18.0	3.6	78.4	100.0
Detroit	1,071	13.7	4.0	82.3	100.0	179	15.0	5.0	80.0	100.0
Los Angeles	1,524	17.2	4.8	78.0	100.0	254	28.0	5.9	66.1	100.0
Philadelphia	1,880	21.9	4.6	73.5	100.0	290	28.4	3.8	67.8	100.0
San Francisco	1,003	18.3	4.2	77.5	100.0	108	22.3	1.8	75.9	100.0
Denver	1,217	17.8	4.9	77.3	100.0	112	29.4	8.0	62.6	100.0
Minneapolis	2,253	7.2	3.1	89.7	100.0	166	18.7	1.8	79.5	100.0
All cities	12,527	15.1	5.4	79.5	100.0	3,793	16.5	5.1	78.4	100.0

[1] Including essentially nonreactors.
[2] Including doubtful reactors.
[3] See text for description of classifications.

sensitivity is uniformly higher among histoplasmin reactors. The difference between the two groups is small in the cities with high histoplasmin sensitivity but quite substantial in those where histoplasmin reactors are rare.

The device used earlier, in which straight lines were fitted to points made by plotting percentages of nonreactors against percentages of definite reactors, was also applied to tuberculin reactions separately for reactors and nonreactors to histoplasmin, and it was found that the same line fitted both groups. Thus, as also seen directly in table 9, the percentage of questionable reactions is about the same in both groups, and not appreciably correlated with the prevalence of tuberculin sensitivity.

The corresponding examination in table 10 of degrees of histoplasmin reactions among reactors and nonreactors to tuberculin, however, reveals another picture, as would be expected from the character of the two-dimensional distribution in table 8. Because so many areas have very few histoplasmin reactors, graphic presentation of the detailed distribution for each city would not be informative. The straight-line technique, however, indicates that a higher percentage of doubtful histoplasmin reactors is found among reactors than among nonreactors to tuberculin.

According to the basic hypothesis of this paper the situation found by considering both tuberculin and histoplasmin reactions can be described thus:

The prevalence of definite reactions to tuberculin among reactors to histoplasmin seems to be higher than among nonreactors to histo-

Table 10. *Number of student nurses tested in specified cities and percentage classified as definite, doubtful, and nonreactors to histoplasmin, for not definite and definite reactors to tuberculin, respectively*

City	Not definite reactors to tuberculin					Definite reactors to tuberculin				
	Number of nurses tested	Percentage				Number of nurses tested	Percentage			
		Definite reactors (A, B, C)[1]	Doubtful reactors (D, E, F)[1]	Nonreactors (O)[1]	Total		Definite reactors (A, B, C)[1]	Doubtful reactors (D, E, F)[1]	Nonreactors (O)[1]	Total
Kansas City, Mo	1,008	57.8	6.7	35.5	100.0	123	56.9	10.5	32.6	100.0
Columbus, Ohio	1,179	56.0	4.6	39.4	100.0	151	52.3	7.3	40.4	100.0
Kansas City, Kans	459	44.7	5.4	49.9	100.0	73	49.3	8.2	42.5	100.0
New Orleans	1,119	21.2	7.1	71.7	100.0	171	21.1	8.2	70.7	100.0
Baltimore	1,618	22.0	3.3	74.7	100.0	353	22.4	3.1	74.5	100.0
Detroit	1,076	12.7	1.4	85.9	100.0	174	12.1	3.4	84.5	100.0
Los Angeles	1,445	9.7	3.0	87.3	100.0	333	14.7	6.5	78.8	100.0
Philadelphia	1,682	9.8	2.9	87.3	100.0	497	12.6	4.4	83.0	100.0
San Francisco	904	6.6	2.7	90.7	100.0	207	8.7	2.9	88.4	100.0
Denver	1,079	6.0	1.3	92.7	100.0	250	9.2	4.0	86.8	100.0
Minneapolis	2,227	3.9	2.2	93.9	100.0	192	7.8	8.4	83.8	100.0
All cities	13,796	19.5	3.4	77.1	100.0	2,524	19.4	5.4	75.2	100.0

[1] See text for description of classifications.

plasmin, but there is nothing to indicate that the distributions of true positives and true negatives, respectively, are different in the two groups. On the contrary, there is evidence of a shift in the pattern of the distributions according to degrees of reaction to histoplasmin when nonreactors to tuberculin are compared with reactors. For tuberculin the situation is similar to the hypothetical case shown in figure 1, and for histoplasmin there is a resemblance to the theoretical possibility illustrated in figure 4.

Certainly, different hypotheses could be formulated to explain this, and one simple possibility should be considered. Tuberculous infection occasionally might produce some allergy to histoplasmin in addition to tuberculin sensitivity. If so, we should expect to find a certain number of nonspecific histoplasmin reactions among persons reacting to tuberculin, but none, or at least not many, among nonreactors to tuberculin. At the same time a sample of histoplasmin reactors would include a higher percentage of persons with a tuberculin reaction than a sample of nonreactors to histoplasmin, simply because the former would include the cases where a cross reaction had taken place.

This highly speculative hypothesis was suggested by the findings from the nurses study, but the available material was not considered sufficient to carry the analysis further.

Summary

A statistical method has been developed as an approach to the interpretation of cutaneous tuberculin and histoplasmin reactions.

Certain characteristics of reactions are pointed out: (a) from their perceptual appearances, reactions form a continuous scale, from large apparently typical reactions to no observable reactions; (b) reactions are influenced to a considerable extent by experimental and physiological errors; and (c) nonspecific reactions may exist and create special problems in interpretation.

In view of these characteristics the simple notion that on the continuous scale of reactions there is a point which separates positives and negatives, becomes insufficient on both practical and theoretical grounds. In its stead, there is proposed the hypothesis that positive and negative reactions are distributed over the scale, the positives tending to be at one end and the negatives at the other, but with some overlapping in an interval or zone on the reaction scale. Reactions in this in-between zone may be designated as doubtful or questionable, and the hypothesis provides that, though it is not possible to distinguish them individually, the group consists of a mixture of erroneously classified true positive and true negative reactions.

A simple mathematical formulation of the hypothesis is applied to

actual data gathered from an extensive study of tuberculosis in student nurses. The theory satisfactorily explains a number of findings which appear very difficult to explain in other ways.

In order to take account of the postulated existence of nonspecific reactions, the simple hypothesis was extended to include a third distribution, superimposed upon the distributions of positive and negative reactions. Schematic illustrations show how an observed distribution of combined positive and negative reactions might be distorted by the presence of a distribution of nonspecific reactions. Examination of the data showed that distortions or perturbations of observed distributions of tuberculin reactions actually do occur and that they suggest that in the prevalence of nonspecific reactions there is a geographic pattern quite different from the pattern of specific reactions.

It is suggested that certain tuberculin reactions, particularly reactions to the high doses in common use today, are actually nonspecific and that they most probably arise as cross reactions resulting from tuberculin hypersensitivity produced by infection with other alcohol-acid-fast organisms.

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APPENDIX

Number of student nurses tested, and number with pulmonary calcifications, according to histoplasmin and to tuberculin reaction, in specified cities throughout the United States

Tuberculin reaction [1]	Number of nurses tested								Number of nurses with pulmonary calcifications							
	Histoplasmin reaction [1]								Histoplasmin reaction [1]							
	A	B	C	D	E	F	O	Total	A	B	C	D	E	F	O	Total
KANSAS CITY, MO.																
G	14	13	16	1	1	5	24	74	7	8	5	0	0	1	3	24
H	6	7	7	1	0	1	12	34	3	3	1	1	0	1	2	11
I	2	3	2	1	2	1	4	15	2	1	2	0	1	1	0	7
J	16	4	8	2	0	1	30	61	6	0	4	0	0	0	1	11
K	66	54	63	8	6	8	107	312	28	14	19	3	3	4	3	74
L	63	51	44	12	5	2	91	268	27	23	16	3	3	0	6	78
O	76	76	62	12	2	9	130	367	30	32	30	4	1	4	3	104
Total	243	208	202	37	16	27	398	1,131	103	81	77	11	8	11	18	309
COLUMBUS, OHIO																
G	26	15	7	3	3	1	38	93	16	3	3	1	1	0	9	33
H	14	6	6	1	2	0	16	45	3	2	1	1	1	0	2	10
I	3	2	0	1	0	0	7	13	2	1	0	1	0	0	0	4
J	12	8	2	3	0	0	19	44	5	2	0	1	0	0	1	9
K	96	46	25	6	6	2	123	304	39	13	13	3	0	0	2	70
L	122	80	46	13	3	4	176	444	47	29	14	7	2	1	0	100
O	123	67	34	8	2	7	146	387	48	29	16	2	0	2	5	102
Total	396	224	120	35	16	14	525	1,330	160	79	47	16	4	3	19	328
KANSAS CITY, KANS.																
G	16	5	9	2	2	0	23	57	7	3	3	0	2	0	5	20
H	2	1	2	0	0	0	7	12	1	1	1	0	0	0	2	5
I	0	0	1	1	0	1	1	4	0	0	0	0	0	0	0	0
J	6	7	4	1	0	0	23	41	3	2	3	0	0	0	2	10
K	41	8	19	2	8	1	71	150	12	4	5	0	2	0	0	23
L	32	10	14	4	2	1	59	122	16	2	0	0	1	1	0	20
O	28	23	13	2	3	1	76	146	8	5	4	0	1	0	1	19
Total	125	54	62	12	15	4	260	532	47	17	16	0	6	1	10	97
NEW ORLEANS																
G	13	4	7	3	2	2	64	95	9	0	3	1	1	0	4	18
H	1	4	1	2	2	0	36	46	0	2	0	0	0	0	2	4
I	2	2	2	0	3	0	21	30	0	0	0	0	0	0	1	1
J	12	19	12	1	5	2	134	185	4	6	2	0	2	0	1	15
K	31	37	34	11	4	14	354	485	14	16	10	2	1	2	1	46
L	17	13	10	10	4	9	138	201	9	5	3	2	0	0	0	19
O	16	22	14	12	3	4	177	248	6	5	3	0	1	0	2	17
Total	92	101	80	39	23	31	924	1,290	42	34	21	5	5	2	11	120
BALTIMORE																
G	21	15	11	2	3	1	156	209	10	6	6	0	1	0	26	49
H	10	5	5	1	2	0	79	102	2	0	2	1	1	0	9	15
I	7	2	3	0	2	0	28	42	2	0	3	0	0	0	0	5
J	9	3	3	2	0	1	94	112	3	0	2	0	0	0	1	6
K	41	35	21	6	3	4	346	456	13	12	8	0	0	0	0	33
L	47	41	29	7	2	5	406	537	13	14	10	2	0	2	6	47
O	63	39	24	17	3	4	363	513	32	15	10	5	0	1	4	67
Total	198	140	96	35	15	15	1,472	1,971	75	47	41	8	2	3	46	222

APPENDIX—Continued

Number of student nurses tested, and number with pulmonary calcifications, according to histoplasmin and to tuberculin reaction, in specified cities throughout the United States—Continued

Tuberculin reaction [1]	Number of nurses tested								Number of nurses with pulmonary calcifications							
	Histoplasmin reaction [1]								Histoplasmin reaction [1]							
	A	B	C	D	E	F	O	Total	A	B	C	D	E	F	O	Total
DETROIT																
G	9	6	4	0	3	1	107	130	3	2	2	0	1	0	15	23
H	1	1	0	0	1	1	31	35	1	0	0	0	0	0	3	4
I	0	0	0	0	0	0	9	9	0	0	0	0	0	0	1	1
J	6	0	2	0	1	0	43	52	1	0	1	0	0	0	0	2
K	24	3	4	0	1	3	199	234	12	2	2	0	0	0	0	16
L	28	10	8	2	2	1	254	305	12	2	3	0	0	0	0	17
O	35	6	11	2	0	3	428	485	15	2	6	0	0	1	1	25
Total	103	26	29	4	8	9	1,071	1,250	44	8	14	0	1	1	20	88
LOS ANGELES																
G	23	4	6	1	7	6	176	223	9	1	0	0	0	2	16	28
H	3	7	2	4	0	2	66	84	2	1	0	0	0	0	4	7
I	0	2	2	1	0	1	20	26	0	0	1	0	0	0	0	1
J	2	3	7	1	0	2	73	88	0	1	1	0	0	1	2	5
K	26	7	11	6	3	2	381	436	8	1	2	0	0	0	2	13
L	24	9	3	1	4	5	299	345	8	2	2	0	0	0	3	15
O	24	10	14	5	7	7	509	576	11	5	2	1	0	0	1	20
Total	102	42	45	19	21	25	1,524	1,778	38	11	8	1	0	3	28	89
PHILADELPHIA																
G	22	6	7	4	1	6	261	307	6	1	2	2	0	1	23	35
H	6	9	5	0	6	1	22	149	1	3	1	0	0	0	9	14
I	2	4	2	1	1	2	29	41	1	2	1	0	0	0	1	5
J	2	3	2	1	1	2	87	98	1	0	0	0	0	0	0	1
K	25	6	13	1	1	11	360	417	6	1	4	0	0	0	3	14
L	18	9	8	1	9	7	413	465	7	3	1	0	0	0	1	12
O	41	23	15	4	7	4	608	702	17	8	5	1	0	0	3	34
Total	116	60	52	12	26	33	1,880	2,179	39	18	14	3	0	1	40	115
SAN FRANCISCO																
G	6	2	3	2	0	1	131	145	2	0	2	1	0	0	16	21
H	1	2	3	1	0	0	41	48	0	2	1	0	0	0	1	4
I	0	0	1	1	1	0	11	14	0	0	0	0	0	0	1	1
J	1	1	0	0	0	0	42	44	0	0	0	0	0	0	3	3
K	10	0	3	0	1	5	156	175	1	0	0	0	0	0	1	2
L	6	2	6	4	1	2	205	226	2	1	0	1	0	0	0	4
O	10	3	18	5	5	1	417	459	5	1	3	1	0	0	1	11
Total	34	10	34	13	8	9	1,003	1,111	10	4	6	3	0	0	23	46
DENVER																
G	6	5	5	1	1	5	137	160	1	5	1	0	0	1	22	30
H	3	0	4	0	3	0	65	75	1	0	1	0	1	0	6	9
I	0	0	0	0	0	0	15	15	0	0	0	0	0	0	2	2
J	6	3	0	0	0	0	59	68	2	1	0	0	0	0	0	3
K	5	0	8	2	2	3	228	248	2	0	4	0	0	1	0	7
L	12	3	1	1	2	1	282	302	6	2	0	0	0	0	2	10
O	16	7	4	1	2	0	431	461	5	4	0	0	0	0	3	12
Total	48	18	22	5	10	9	1,217	1,329	17	12	6	0	1	2	35	73

Number of student nurses tested, and number with pulmonary calcifications, according to histoplasmin and to tuberculin reaction, in specified cities throughout the United States—**Continued**

Tuberculin reaction[1]	Number of nurses tested								Number of nurses with pulmonary calcifications							
	Histoplasmin reaction[1]								Histoplasmin reaction[1]							
	A	B	C	D	E	F	O	Total	A	B	C	D	E	F	O	Total
MINNEAPOLIS																
G	4	4	6	3	7	2	115	141	3	3	3	1	2	0	14	26
H	0	1	0	1	1	2	31	36	0	0	0	0	0	1	3	4
I	0	0	0	0	0	0	15	15	0	0	0	0	0	0	1	1
J	3	0	0	0	0	0	71	74	0	0	0	0	0	0	0	0
K	13	1	2	2	12	3	471	504	4	0	0	0	1	0	3	8
L	17	5	5	0	8	4	640	679	4	2	1	0	0	0	3	10
O	27	6	7	3	8	9	910	970	7	1	0	0	1	0	5	14
Total	64	17	20	9	36	20	2, 253	2, 419	18	6	4	1	4	1	29	63
ALL CITIES																
G	160	79	81	22	30	30	1, 232	1, 634	73	32	30	6	8	5	153	307
H	47	43	35	11	17	7	506	666	14	14	8	3	3	2	43	87
I	16	15	13	6	9	5	160	224	7	4	7	1	1	1	7	28
J	75	51	40	11	7	8	675	867	25	12	13	1	2	1	11	65
K	378	197	203	44	47	56	2, 796	3, 721	139	63	67	8	7	7	15	306
L	386	233	174	55	42	41	2, 963	3, 894	151	85	50	15	6	4	21	332
O	459	282	216	71	42	49	4, 105	5, 314	184	107	79	14	4	8	29	425
Total	1, 521	900	762	220	194	196	12, 527	16, 320	593	317	254	48	31	28	279	1, 550

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[1] See text for description of classifications.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED DECEMBER 17, 1949

For the seventeenth consecutive week the total reported incidence of poliomyelitis in the Nation decreased from the preceding week. The total number of cases reported for the week is 243 as compared with 322 last week and 115 for the 5-year (1944–48) median. Twenty-six States reported an aggregate decrease from the preceding week of 122 cases, ranging from 1 in 9 States to 22 (from 56 to 34) in California. Fifteen States reported an aggregate increase of 43 cases, ranging from 1 in 6 States to 9 (from 0 to 9) in Vermont.

Compared with last week, decreases occurred in diphtheria, influenza, measles, scarlet fever, and whooping cough. The incidence of each disease was also below the 5-year median. Increases may be noted in meningococcal meningitis (from 56 cases last week to 76 currently) and tularemia (from 22 to 34). One case of leprosy was reported in California.

A sharp increase in influenza occurred in Hawaii with 530 cases reported for the week as compared with 229 last week. For the months of February and March of this year there were 936 and 952 cases, respectively, reported in Hawaii. No unusual influx of influenza has occurred in the Pacific States. California, Oregon, and Washington reported 9, 8, and 1 cases, respectively, for the current week.

Of 40 States and the District of Columbia reporting on rabies in animals, 21 and the District of Columbia reported no cases, while the remaining 19 reported a total of 105 cases. The States reporting the largest numbers were Texas (20), New York (14), and Ohio (12). The total number of rabies in animals reported to date is 5,459, which includes 8 delayed cases in Arkansas.

A total of 9,366 deaths was recorded during the week in 93 large cities in the United States as compared with 9,491 last week; 9,664 and 9,430, respectively, for the corresponding weeks of 1947 and 1948; and 9,430 for the 3-year (1946–48) median. For the year to date the total is 456,537 as compared with 456,826 for the same period last year. Infant deaths for the current week totaled 593; for last week, 696; for the corresponding week last year, 744; and the 3-year median, 744. The cumulative figure is 32,566 as compared with 33,324 for the corresponding period last year.

Telegraphic case reports from State health officers for week ended December 17, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	------	------	------	8	------	6	2	------	4	------	------	------	2	------
New Hampshire	------	------	1	------	------	------	------	------	------	------	------	------	------	------
Vermont	------	------	------	1	------	1	9	------	6	------	------	------	6	------
Massachusetts	3	1	------	25	2	------	2	------	62	------	------	------	87	------
Rhode Island	------	------	------	1	------	2	1	------	9	------	------	------	4	------
Connecticut	------	------	------	31	4	48	4	------	16	------	------	------	89	------
MIDDLE ATLANTIC														
New York	3	------	(3)	112	4	245	28	1	[5] 45	------	1	2	193	14
New Jersey	------	------	8	117	------	41	4	------	20	------	------	------	125	1
Pennsylvania	3	------	------	46	7	70	3	------	65	------	------	------	137	------
EAST NORTH CENTRAL														
Ohio	4	------	1	28	5	69	9	------	185	------	3	------	106	12
Indiana	6	------	4	30	3	4	1	------	36	------	2	------	16	5
Illinois	------	1	------	44	3	56	10	------	45	------	5	2	85	3
Michigan [4]	4	------	1	347	6	50	18	------	91	------	1	1	182	3
Wisconsin	2	------	13	73	------	22	16	------	51	------	------	1	146	------
WEST NORTH CENTRAL														
Minnesota	2	------	------	74	4	4	4	------	25	------	1	------	12	1
Iowa	1	------	------	31	------	1	10	------	11	------	------	------	3	2
Missouri	8	------	4	5	3	15	2	------	20	------	2	------	25	9
North Dakota	------	------	15	19	------	------	------	------	------	------	------	------	3	------
South Dakota	------	------	------	2	------	------	1	------	7	------	------	------	------	------
Nebraska	------	------	2	24	1	------	7	------	6	------	------	------	------	------
Kansas	1	------	------	4	------	14	6	------	18	------	------	2	8	2
SOUTH ATLANTIC														
Delaware	------	------	------	5	2	------	1	------	2	------	------	------	8	------
Maryland [4]	1	------	------	15	------	24	2	------	16	------	1	------	71	------
District of Columbia	------	------	------	43	------	6	------	------	3	------	------	1	2	------
Virginia	6	------	187	8	3	55	1	------	10	------	5	2	19	1
West Virginia	1	------	145	131	------	14	------	------	10	------	1	1	15	------
North Carolina	9	------	------	42	4	------	7	------	82	------	------	1	19	------
South Carolina	5	------	37	10	------	26	------	------	11	------	------	2	6	3
Georgia	8	------	67	8	2	20	3	------	29	------	1	1	6	8
Florida	3	------	8	7	------	13	3	------	12	------	1	1	2	------

EAST SOUTH CENTRAL														
Kentucky	11	-----	17	16	5	39	1	-----	60	-----	2	6	21	3
Tennessee	14	-----	29	7	3	66	2	-----	60	-----	1	-----	18	6
Alabama	5	-----	30	6	-----	69	2	-----	27	-----	-----	-----	2	7
Mississippi [4]	10	-----	15	27	-----	16	2	-----	7	-----	-----	1	-----	-----
WEST SOUTH CENTRAL														
Arkansas	5	-----	62	1	1	64	5	-----	3	-----	2	-----	36	3
Louisiana	13	-----	-----	5	-----	17	1	-----	4	-----	-----	-----	4	-----
Oklahoma	3	-----	31	12	1	19	5	-----	4	-----	-----	-----	9	-----
Texas	17	3	1, 592	39	8	347	12	-----	23	-----	-----	2	90	20
MOUNTAIN														
Montana	1	-----	1	32	-----	-----	-----	-----	12	-----	3	-----	1	-----
Idaho	-----	-----	30	9	-----	10	7	-----	1	-----	-----	-----	7	-----
Wyoming	-----	-----	-----	3	1	7	1	-----	-----	-----	1	-----	-----	-----
Colorado	-----	-----	14	18	-----	1	3	-----	18	-----	-----	2	1	-----
New Mexico	-----	-----	-----	17	-----	5	1	1	3	-----	-----	-----	-----	-----
Arizona	1	-----	108	28	1	16	1	-----	6	-----	-----	-----	20	-----
Utah [4]	-----	-----	1	72	-----	2	3	-----	5	-----	1	1	6	-----
Nevada	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PACIFIC														
Washington	-----	-----	1	106	-----	2	2	-----	70	-----	-----	-----	44	-----
Oregon	-----	-----	8	22	-----	23	7	-----	12	-----	-----	-----	11	-----
California	3	2	9	63	5	14	34	-----	80	-----	-----	4	71	2
Total	153	7	2, 441	1, 774	78	1, 523	243	2	1, 292	-----	34	33	1, 718	-----
Median, 1944–48	396	8	2, 924	2, 592	70	-----	115	1	2, 267	3	36	56	2, 125	-----
Year to date 49 weeks	7, 750	738	101, 488	602, 862	3, 303	74, 572	[5] 42, 025	560	72, 561	48	1, 074	3, 540	65, 274	-----
Median, 1944–48	13, 434	612	309, 648	600, 719	5, 535	-----	19, 107	522	109, 152	330	965	3, 925	96, 419	-----
	(27th)	-----	(30th)	(35th)	(37th)	-----	(11th)	-----	(32d)	(35th)	-----	(11th)	(39th)	-----
	July 9	-----	July 30	Sept. 3	Sept. 17	-----	Mar. 19	-----	Aug. 13	Sept. 3	-----	Mar. 19	Oct. 1	-----
Seasonal low week ends	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Since seasonal low week	3, 982	-----	25, 621	14, 344	787	-----	[5] 41, 110	-----	14, 301	7	-----	3, 080	18, 672	-----
Median, 1944–45 to 1948–49 [6]	6, 946	-----	29, 177	21, 111	869	-----	18, 844	-----	22, 857	51	-----	3, 450	20, 544	-----

---

[1] Including paratyphoid fever currently reported separately as follows: New York 1, Kansas 2, Georgia 1, Colorado 1, California 2. Cases reported as salmonella infection not included in the table were as follows: New York 2, Pennsylvania 1.

[2] New York City only.

[3] Including cases reported as streptococcal sore throat.

[4] Period ended earlier than Saturday.

[5] Deduction: Michigan, 1 case week ended December 3.

[6] The median of the 5 preceding corresponding periods (1944–45 to 1948–49).

Leprosy: California 1 case.
Alaska: Influenza 5, measles 6, pneumonia 1, septic sore throat 1.
Hawaii: Influenza 530, measles 1, meningitis 1.

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended November 26, 1949.—During the week ended November 26, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	----	----	2	----	246	315	89	61	65	134	912
Diphtheria	----	----	----	1	12	1	----	----	----	----	14
Dysentery, bacillary	----	----	----	----	1	2	----	----	----	----	3
German measles	----	----	----	----	13	18	----	5	53	8	97
Influenza	----	----	3	----	----	6	1	1	----	----	11
Measles	----	----	2	1	234	142	163	135	98	145	920
Meningitis, meningococcal	----	----	----	----	1	1	----	----	----	1	3
Mumps	----	----	42	----	90	207	2	17	37	172	567
Poliomyelitis	----	----	----	----	1	2	1	2	----	1	7
Scarlet fever	5	----	4	6	64	22	22	4	26	5	158
Tuberculosis (all forms)	22	----	1	6	80	21	11	4	134	30	309
Typhoid and paratyphoid fever	----	----	----	1	11	1	----	----	----	3	16
Undulant fever	----	----	----	----	1	----	2	----	----	----	3
Venereal diseases:											
Gonorrhea	7	5	4	15	101	68	29	15	43	73	360
Syphilis	3	4	10	11	62	32	9	5	1	10	147
Whooping cough	2	----	----	----	201	60	3	1	2	17	286

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

(Cases)

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January—September 1949	October 1949	November 1949—week ended—			
			5	12	19	26
ASIA						
Burma	245	----	----	[1] 1	----	----
Bassein	183	----	----	----	----	----
Moulmein	2	----	----	[1] 1	----	----
Rangoon	[2] 3	----	----	----	----	----
Ceylon	2	----	----	----	----	----
Trincomalee	2	----	----	----	----	----
China:						
Amoy	[3] 1	----	----	----	----	----

See footnotes at end of table.

CHOLERA—Continued

Place	January—September 1949	October 1949	November 1949—week ended— 5	12	19	26
ASIA—continued						
India	77,732	6,663	1,730	41	24	54
Ahmedabad	1					
Allahabad	13	4				
Bombay	[1] 6					
Calcutta	[4] 4,805	222	57	40	24	54
Cawnpore	188	2				
Cocanada	14					
Cuddalore	2					
Lucknow	[2] 33			1		
Madras	429	4				
Masulipatam	1					
Nagpur	24	18	2			
Negapatam	26					
New Delhi	[2] 19	1				
Tuticorin	14					
India (French):						
Karikal	55					
Pondicherry	100					
Indochina (French):						
Cambodia	45					
Cochinchina	11					
Pakistan	25,024	786	1	1		
Chittagong	75					
Dacca	99		[5] 1	[5] 1		
Lahore	[2] 24					
Siam (Thailand)	9					
Bangkok	8					

---

[1] Imported. [2] Includes 1 imported case. [3] Suspected, with 2 deaths. [3] Suspected. [4] Includes imported cases. [5] Death.

PLAGUE

(Cases)

AFRICA						
Basutoland	42					
Belgian Congo	[1] 15				1	
Costermansville Province	3				1	
Stanleyville Province	[1] 12					
British East Africa:						
Kenya	5					
Tanganyika	15					
Madagascar	91	20		[2] 1	[3] 1	
Tananarive	6					
Rhodesia, Northern	2					
Union of South Africa	77	8	2			2
Cape Province	[4, 5] 42	3	1			2
Orange Free State	[4] 12	[6, 7] 2				
Transvaal	4					
ASIA						
Burma	444	[4] 3				
Mandalay	1					
Moulmein	[8] 6					
Rangoon	[8] 8					
China:						
Chahar Province		[9] 49				
Chekiang Province	7					
Wenchow	7					
Fukien Province	20					
Kiangsi Province	9					
India	[8] 27,435	1,670	360		[10] 1	[11] 1
Indochina (French)	126					
Annam	67				1	
Cambodia	24					
Cochinchina	[12] 32					
Laos	3					
Java	225	235	53	38	57	43
Jogjakarta Residency	192	235	53	38	57	43
Siam (Thailand)	166	11	2			
EUROPE						
Portugal: Azores	5					

See footnotes at end of table.

PLAGUE—Continued

Place	January—September 1949	October 1949	November 1949—week ended—			
			5	12	19	26
SOUTH AMERICA						
Brazil:						
Bahia State	13					
Ceara State	[13] 9					
Pernambuco State	[14] 19					
Ecuador:						
Loja Province	6	3				
Peru:						
Lambayeque Department	10					
Libertad Department	1					
Lima Department	8					
Piura Department	10					
Tumbes Department						[15] 1
Venezuela:						
Aragua State	2					
OCEANIA						
Hawaii Territory					[16] 1	
Plague infected rats [17]		1				[18] 2

---

[1] Includes 2 cases of pneumonic plague. [2] Nov. 1–10, 1949. [3] Nov. 11–20, 1949. [4] Includes suspected cases. [5] Includes 11 cases of pneumonic plague. [6] Suspected. [7] Includes 1 case of pneumonic plague. [8] Includes imported cases. [9] Deaths. [10] In Calcutta. [11] In Lucknow. [12] Includes 7 cases of pneumonic plague. [13] May 1–June 30, 1949. [14] Jan. 1–May 31, 1949. [15] Nov. 1-30, 1949. [16] At Haina, Hamakua District, Island of Hawaii, onset October 31, 1949. [17] Plague infection has also been reported in Hawaii Territory as follows: On Mar. 12, 1949, in mass inoculation of 2 pools of tissue from 10 rats (8 and 2), taken on Maui Island; on Mar. 16, 1949, in mass inoculation of 3 pools of 29 fleas (7, 12, and 10), on Aug. 4, 1949, in mass inoculation of 15 fleas, on Aug. 18, 1949, in a pool of 31 fleas, and on Sept. 15, 1949, in 49 fleas, all collected from rats taken on the Island of Hawaii. [18] Includes 1 mouse

SMALLPOX

(Cases)

(P=present)

AFRICA						
Algeria	211	31		[1] 16		
Angola	[2] 633					
Basutoland	1					
Bechuanaland	3					
Belgian Congo	[2] 1,669	185	20	64	21	
British East Africa:						
Kenya	25					
Nyasaland	1,047	69	1	13		
Tanganyika	699					
Uganda	38					
Cameroon (British)	21					
Cameroon (French)	69	1				
Dahomey	380	30		[1] 13	[3] 10	[4] 6
Egypt	3	[5] 1				
Eritrea	1					
Ethiopia	10					
French Equatorial Africa	253	126		[1] 31		
French Guinea	1					
French West Africa: Haute Volta	121					
Gambia	58					
Gold Coast	50					
Ivory Coast	296	2			[3] 2	
Liberia	3					
Morocco (French)	9					
Morocco (International Zone)	2					
Mozambique	257	40	22	9		
Nigeria	7,844	[6] 96	[6] 21	[6] 14	[6] 10	[6] 16
Niger Territory	603	103		[1] 9	[3] 19	
Portuguese Guinea	1					
Rhodesia:						
Northern	9				2	
Southern	531	171				
Senegal	16					
Sierra Leone	114					
Sudan (Anglo-Egyptian)	[2, 7] 217	7	7	2	6	4
Sudan (French)	159					
Togo (French)	136	12				
Tunisia	1					
Union of South Africa	994	89	P	P	P	

See footnotes at end of table.

SMALLPOX—Continued

Place	January–September 1949	October 1949	November 1949—week ended— 5	12	19	26
ASIA						
Afghanistan	211					
Arabia	45		4	12		
Bahrein Islands	58	1		1	3	1
Burma	[7] 1,693	122	25	40	40	
Ceylon	[5] 2					
China	967	2		1		
India	62,893	1,606	264	33	39	74
India (French): Yanaon	1					
India (Portuguese)	222					
Indochina (French)	2,462	30	21	6	4	
Iran	297	19	6			
Iraq	475	57	1	24	25	28
Israel	5					
Japan	120			1		
Korea (Southern)	8,908	37				
Lebanon	[7] 140				1	
Malay States (Federated)	43	3				
Manchuria: Port Arthur	9					
Netherlands Indies:						
Java	[7] 11,101	1,278	113	105	94	78
Riouw Archipelago	2					
Sumatra	[7] 194	21	2		1	
Pakistan	3,736	75				
Palestine	62	25				
Philippine Islands:						
Mindoro Island	11					
Romblon Island	[5] 4					
Tablas Island	2					
Portuguese Timor	4					
Siam (Thailand)	102				1	
Straits Settlements: Singapore	[7] 2					
Syria	506	99	11	4	6	1
Transjordan	195					
Turkey. (See Turkey in Europe.)						
EUROPE						
Belgium	1					
Germany (U. S. Zone)	1				1	
Great Britain: England and Wales	[7] 20		[8] 1	[9] 1		
Italy	[10] 98					
Portugal	7					
Spain	3					
Canary Islands	6					
Turkey	92					
NORTH AMERICA						
Cuba: Habana	[7] 6					
Guatemala	4					
Mexico	[2] 106	20			2	
SOUTH AMERICA						
Argentina	[2] 253	44		5	4	12
Bolivia	35					
Brazil	[2] 284	24	8	4	4	16
Chile	[5] 2					
Columbia	[2] 2,310	135	18			
Ecuador	[2] 585	26		[11] 1	[11] 3	
Paraguay	[2] 6	2				
Peru	3,678					
Uruguay					[11] 1	[11] 1
Venezuela	[2] 1,903	[11] 7				
OCEANIA						
Guam	2					

---

[1] November 1–10, 1949. [2] Includes alastrim. [3] November 11–20, 1949. [4] November 21–30, 1949. [5] Imported. [6] In the port of Lagos. [7] Includes imported cases. [8] Laboratory case. [9] Contact of laboratory case. [10] Includes 95 cases of varioloid reported in Rome Jan. 1–June 10, 1949. [11] Alastrim.

TYPHUS FEVER *

(Cases)

(P—present)

Place	January—September 1949	October 1949	November 1949—week ended—			
			5	12	19	26
AFRICA						
eria	68	7		[1] 5		
utoland	24	1				
gian Congo	[2] 42					
ish East Africa:						
Kenya	76					
Nyasaland	4					
Tanganyika	1					
pt	176	1				
rea	67	4		1		
iopia	532					
d Coast	3					
ya	171	9			2	
dagascar: **Tananarive**	[3] 10					
rocco (French)	17			[1] 1		
rocco (Spanish)	23					
ra Leone	[2] 1					
isia	69	1				
on of South Africa	130	8	P	P	P	
ASIA						
hanistan	1, 570					
bia: **Aden**	[4] 2					
ma	5					
lon: **Colombo**	[2] 5		[2] 1			
na	53					
ia	234	2				
ia (Portuguese)	44	17	6			
ochina (French)	18	1		1	1	
1	161	5	2			
1	[3] 65	6	4	2		
an	92	5				
ea (Southern)	[3] 1, 171	8				
banon	[3] 4					
kistan	590	2				1
estine	110					
ilippine Islands: **Manilla**	[2] 1					
aits Settlements: **Singapore**	[2] 2	1				
ia	23			2	1	
nsjordan	60			1		2
rkey. (See Turkey in Europe.)						
EUROPE						
lgium	[3, 4] 5					
lgaria	393					
echoslovakia	22					
ance	5					
eat Britain:						
England and Wales	[2, 5] 4					
Malta and Gozo	[2] 18	5	2		2	
eece	[3] 58			1	12	
ngary	20					
ly	[3] 21	4				
Sicily	28					
land	295	20				
rtugal	6					
mania	417					
ain	7					
rkey	171	15	5	5	6	9
goslavia	184	11				
NORTH AMERICA						
hama Islands: **Nassau**	[2] 1					
sta Rica [2]	36	7			1	
ba [2]	3					
atemala	42					
naica [2]	18	1				
xico [3]	185	27	3	8	7	3
nama Canal Zone [2]	12					
nama (Republic)	[2] 5					
erto Rico [2]	36	7	1			

See footnotes at end of table.

TYPHUS FEVER—Continued

Place	January—September 1949	October 1949	November 1949—week ended—			
			5	12	19	26
SOUTH AMERICA						
Argentina [2]	2					
Bolivia	53					
Brazil	[3] 6					
Chile [3]	258	16		1		
Colombia [3]	2, 230	171	8			
Curacao [2]	5					
Ecuador [3]	292	17				
Peru	1, 103					
Venezuela [3]	95	3	2			
OCEANIA						
Australia [1]	105	10	3	2		1
Hawaii Territory [2]	13	3				

*Reports from some areas are probably murine type, while others include both murine and louse-borne types.

[1] Nov. 1-10, 1949. [2] Murine type. [3] Includes murine type. [4] Includes imported cases. [5] Imported.

YELLOW FEVER

(C=cases; D=deaths)

AFRICA						
Belgian Congo:						
Stanleyville Province D	5					
French Equatorial Africa:						
Bangui D	1					
Gold Coast C	24	2				
Accra D		1				
Birim District C	[1] 3					
Komenda Village [2] D	1					
Nkwanta Dunkwa Area D	1					
Oda Area:						
Akwatia C	[3] 5					
Atiankama C	[4] 1					
Bawdua C	[4] 2	[4] 1				
Esuboni C	[4] 3					
Oseikrome Village D	1					
Winneba Area:						
Apam D	1					
Akukuom D	1					
Nyakrom C	[5] 5					
Nigeria:						
Kaduna D	1					
Lagos D	[6] 2					
Sudan (French):						
Bamako D	[4] 1					
NORTH AMERICA						
Panama:						
Colon Province D	3					
Pacora C	[7] 8					
SOUTH AMERICA						
Brazil:						
Acre Territory D	1					
Amazonas State D	1					
Para State D	3					
Ecuador:						
Napo Pastaza Province D	1					
Peru:						
Cuzco Department D	3					
San Martin Department D	1					

[1] Includes 2 suspected cases. [2] Near seaport of Sekondi. [3] Includes 1 suspected case. [4] Suspected. [5] Includes 2 suspected cases (1 fatal), and 3 fatal confirmed cases. [6] Imported. [7] Reported Jan. 15, 1949. Date of occurrence Nov. 11–Dec. 30, 1948. 5 cases (all fatal) confirmed, 3 suspected cases.

DEATHS DURING WEEK ENDED DECEMBER 17, 1949

	Week ended Dec. 17, 1949	Corresponding week, 1948
Data for 93 large cities of the United States:		
Total deaths	9, 366	9, 430
Median for 3 prior years	9, 430	----------
Total deaths, first 50 weeks of year	456, 537	456, 826
Deaths under 1 year of age	593	744
Median for 3 prior years	744	----------
Deaths under 1 year of age, first 50 weeks of year	32, 566	33, 324
Data from industrial insurance companies:		
Policies in force	69, 962, 439	70, 759, 752
Number of death claims	12, 815	12, 140
Death claims per 1, 000 policies in force, annual rate	9. 6	9. 0
Death claims per 1, 000 policies, first 50 weeks of year, annual rate	9. 1	9. 2

✦ ✦ ✦

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Public Health Reports

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
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Public Health Reports

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Studies of the Action of Sodium Fluoride on Human Enamel by Electron Microscopy and Electron Diffraction

By DAVID B. SCOTT, D. D. S., ROBERT G. PICARD, PH. D.,
and RALPH W. G. WYCKOFF, PH. D.*

Clinical evidence accumulated over the past few years has indicated that the topical application of a sodium fluoride solution is effective in controlling dental caries (*1*). The mechanism by which the fluoride acts is as yet not known and is a matter of widespread laboratory investigation. Most studies to this end have been in the field of analytical chemistry, and they have shown that fluorine is taken up by powdered enamel suspended in solutions of sodium fluoride (*2*), and that after such treatment the powdered enamel is less soluble in certain dilute acids (*3, 4, 5*). Recent studies have demonstrated that electron microscopy, and X-ray and electron diffraction afford useful physical approaches to the problem. Gerould, by electron microscopy of silica replicas (*6*), has shown a deposit on enamel slabs after immersion for 30 days in 4 percent NaF. His X-ray and electron diffraction studies of fluoride-treated samples of powdered enamel have indicated that the product of the reaction is calcium fluoride. Holager and Syrrist (*7*), and Syrrist (*8*), have also reported that calcium fluoride is formed.

This report describes three sets of experiments designed to study by electron microscopy the visible effect of treating enamel with sodium fluoride, and to study by electron diffraction the crystalline changes on similarly treated enamel surfaces. The first series involves the electron microscopy of enamel slabs treated for varying lengths of time with NaF solutions; the second is devoted to the electron microscopy of enamel slabs etched with acid before and after treatment with NaF. In the third set of experiments, electron diffraction studies have been made of the crystalline composition of the surfaces of enamel slabs before and after similar treatments.

---

*National Institute of Dental Research, National Institutes of Health; RCA Victor Division, Camden, N. J.; and Laboratory of Physical Biology, Experimental Biology and Medicine Institute, National Institutes of Health, Bethesda, Md., respectively.

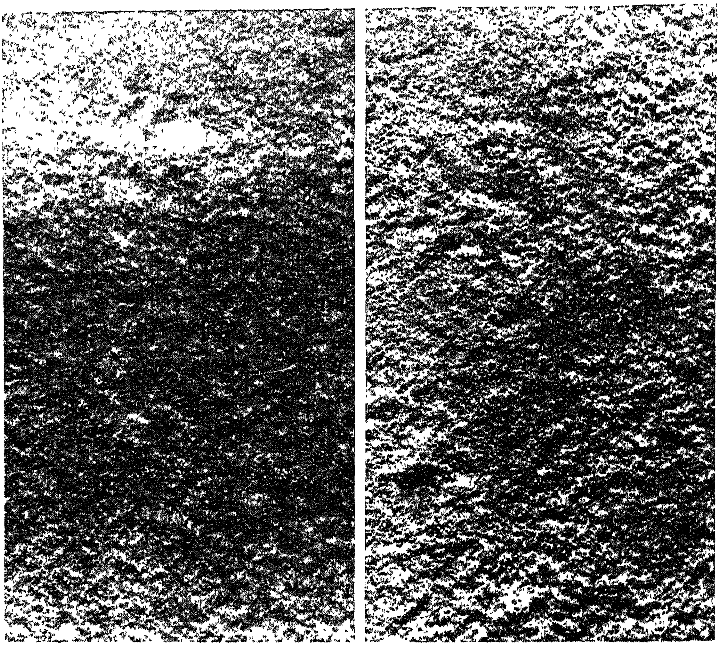

Figure 1. Left and right: minute roughness observed in most control specimens (7,200X).

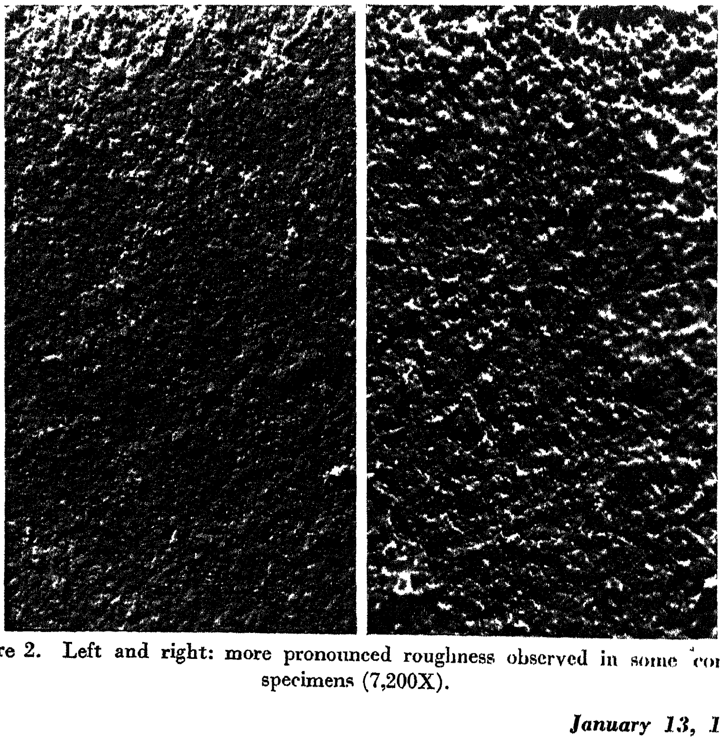

Figure 2. Left and right: more pronounced roughness observed in some control specimens (7,200X).

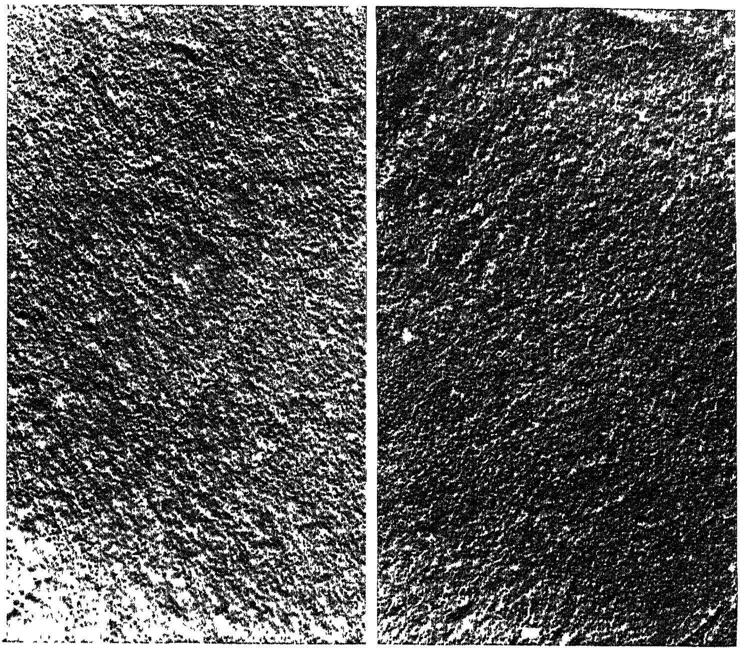

Figure 3. Typical appearance of enamel immersed in NaF for 5 minutes (left) and 24 hours (right) (7,200X).

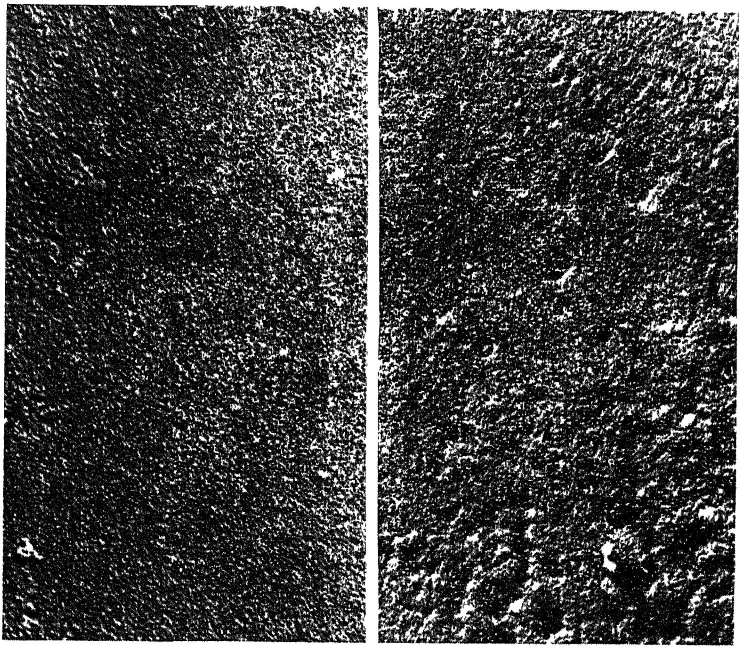

Figure 4. Normal (left) and slightly changed (right) areas on enamel after 2 and 7 days in NaF (7,200X).

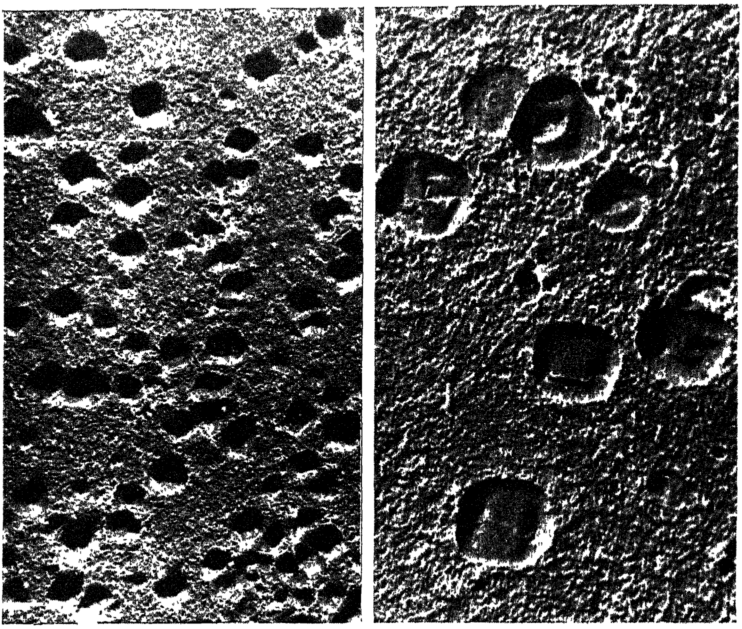

Figure 5. Deposit formed on enamel after 15 days in NaF. (Left, 7,200X; right, 11,000X).

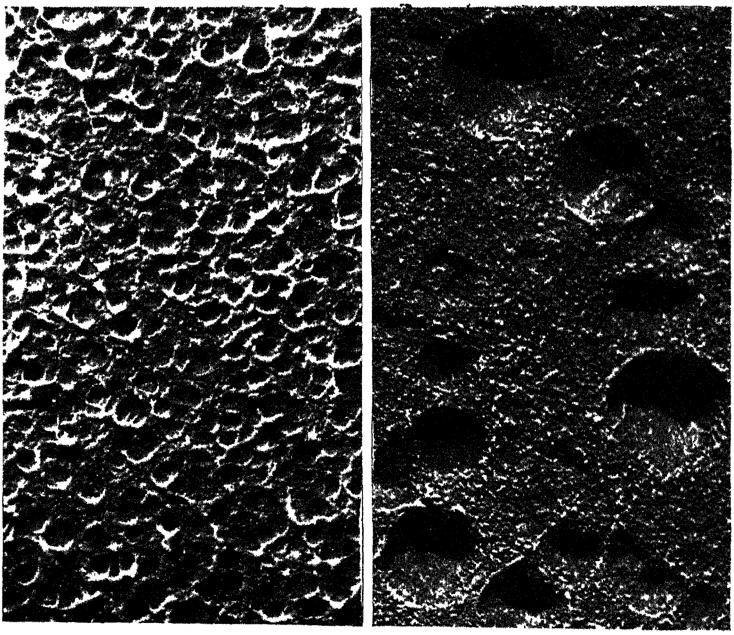

Figure 6. Deposit formed on enamel after 30 days in NaF. (Left, 7,200X; right, 11,000X).

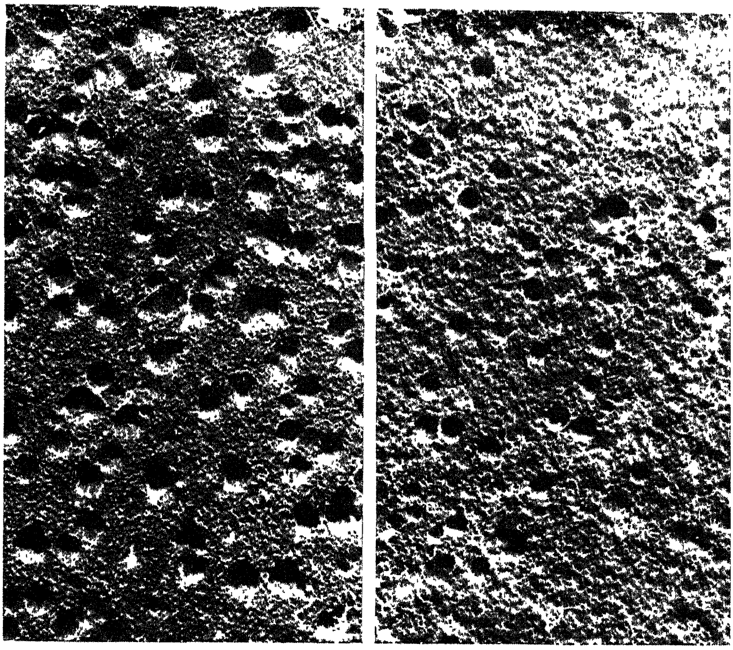

Figure 7. Appearance of 30-day NaF treated specimens after 1 day (left) and 3 days (right) washing (7,200X).

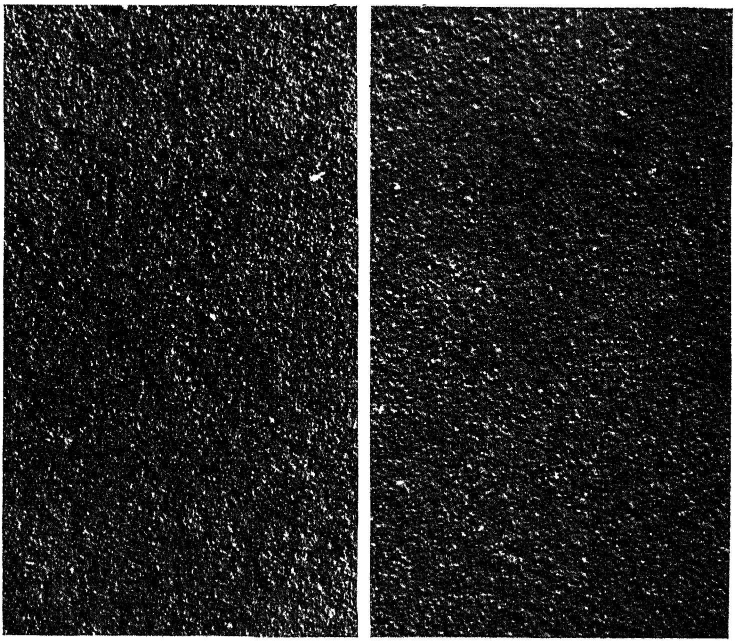

Figure 8. Appearance of 30-day NaF treated specimens (left) and controls (right) after 6 days washing (7,200X).

with NaF are required to alter the appearance of enamel as seen at the high magnifications of the electron microscope. They show that immersion for about 7 days in 2 percent NaF solutions is required to establish the first obvious traces of a surface deposit, and that the effect is progressively more pronounced at 15 and 30 days.

The permanence of the deposit was investigated through washing experiments. The test objects were 36 slabs which had been immersed for 30 days in 4 percent NaF. To serve as controls, a similar number of slabs were immersed in water and the same number in 5 percent NaCl for 30 days. After immersion, each group of slabs was placed in a separate glass vessel containing two liters of distilled water agitated by a mechanical stirrer. The water was changed daily, and 12 specimens were removed from each group after 1 day of washing, 12 after 3 days, and 12 after 6 days. A pronounced deposit remained on all the NaF-treated specimens which had been washed for 1 day (fig. 7, left); traces of deposit were observed after 3 days of washing (fig. 7, right), but no deposit was seen after 6 days of washing (fig. 8, left). Both the water and NaCl controls appeared normal after each period of washing (fig. 8, right). It thus appears from these preliminary experiments that the surface deposit which results from long immersion in NaF solutions is slowly removed by immersion in water. Subsequent studies are planned to investigate further the permanence of such deposits.

Electron Microscopy of Enamel Etched Before and After Immersion in Sodium Fluoride Solutions

It has previously been reported by Gerould (*6*) that a surface deposit is formed on enamel pre-etched with acid and immersed in NaF, and by Gerould (*6*), Holager and Syrrist (*7*), and Syrrist (*8*), that enamel becomes more resistant to acid after treatment with NaF. In the course of other studies in this laboratory on the fine structure of enamel, marked variations have been noted in its response to acid. The acid which has been most often used, and which has revealed much interesting fine detail, is 0.1 N HCl. Gerould (*6*), using silica replica techniques, and Syrrist (*8*), using a double replica method, etched enamel for 10 seconds in 0.1 N HCl, but this period seems to produce too great a depth of etch for satisfactory shadowed collodion replica studies. Although in many areas the resulting etch is sufficiently shallow to produce detail which can be visualized clearly, in most cases the elevations and depressions are so great, and their shadows so long, that much detail is obscured (fig. 9, left). We have found the most generally useful etch to be one obtained through 5 seconds contact with 0.1 N HCl. With this etch, it has been repeatedly observed that in different areas on a single specimen, and on different specimens, the enamel may be so etched as to produce a pronounced enamel rod pattern (fig. 9, right), a faint rod pattern (fig. 10, left), or even no apparent change in structure at all (fig. 10, right). This makes it necessary to exercise considerable caution in the interpretation of structural differences seen in etched fluoride-treated specimens.

A deposit similar to that noted on unetched specimens is formed when pre-etched specimens are placed in NaF solutions. This was demonstrated in an experiment in which 28 enamel slabs were etched for 5 seconds in 0.1 N HCl, rinsed by agitation in distilled water for one minute, and placed in 4 percent NaF. Twelve specimens were removed after 15 days and the rest after 30 days. A deposit was observed under the electron microscope on most of the surfaces, and it was present in amounts roughly similar to those seen on the unetched slabs. In many instances an enamel rod pattern could no longer be seen (fig. 11, left); in some areas it was only faintly visible (fig. 11, right), and in a few cases it was as pronounced as that found on the controls, with no trace of deposit.

In a second experiment, 20 slabs were etched for 5 seconds, and washed for 24 hours in a vessel containing 2 liters of distilled water agitated by a mechanical stirrer prior to immersion in the NaF. This was done in order to be certain that all of the soluble salts and debris were thoroughly removed from the etched surfaces. The specimens were then immersed for 30 days in 4 percent NaF, washed, and replicated as usual. The deposit was noted on most of these preparations, but their study left the general impression that it was less plentiful than before.

It has proved equally difficult to interpret the results of etching specimens subsequent to their immersion in fluoride solutions because of their varied appearance after etch. In one trial 30 specimens, immersed in 2 percent NaF for periods of 5 minutes to 40 hours, rinsed for 1 minute, and etched for 5 seconds with 0.1 N HCl, showed no deposit and had surface structures similar to those in etched untreated enamel. There was, however, some suggestion of an increased acid resistance of the surfaces of 20 other specimens which had been immersed for 30 days, and similarly etched. After etching, some specimens still showed traces of deposit (fig. 12, left), but other specimens appeared to be free of deposit (fig. 12, right), and a few showed areas of apparently normal etched enamel. It is evident that much more work must be done with etched normal and treated enamel before definite evidence can be obtained concerning changes in acid solubility brought about by NaF.

Electron Diffraction of Enamel Treated with Sodium Fluoride

Although the electron microscope has revealed the formation of a visible deposit on enamel surfaces after prolonged immersion in NaF

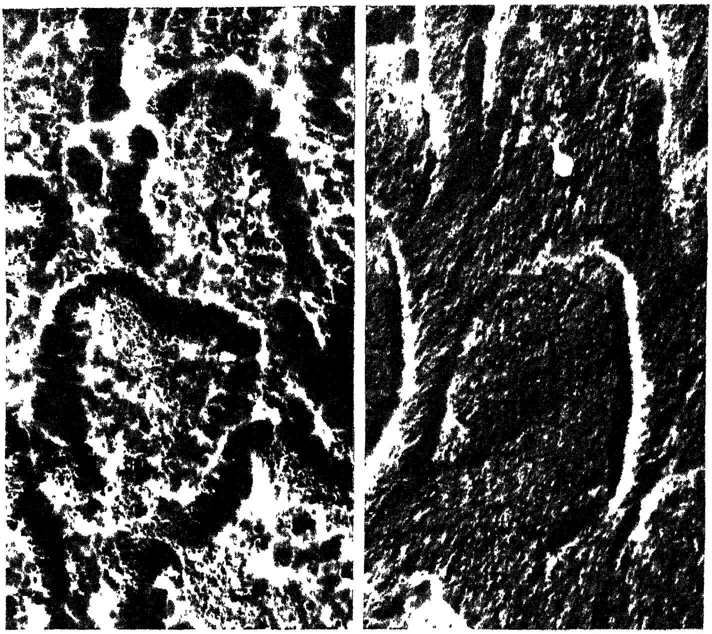

Figure 9. Left: untreated enamel etched 10 seconds with 0.1 N HCl. Right: untreated enamel etched 5 seconds with 0.1 N HCl (7,200X).

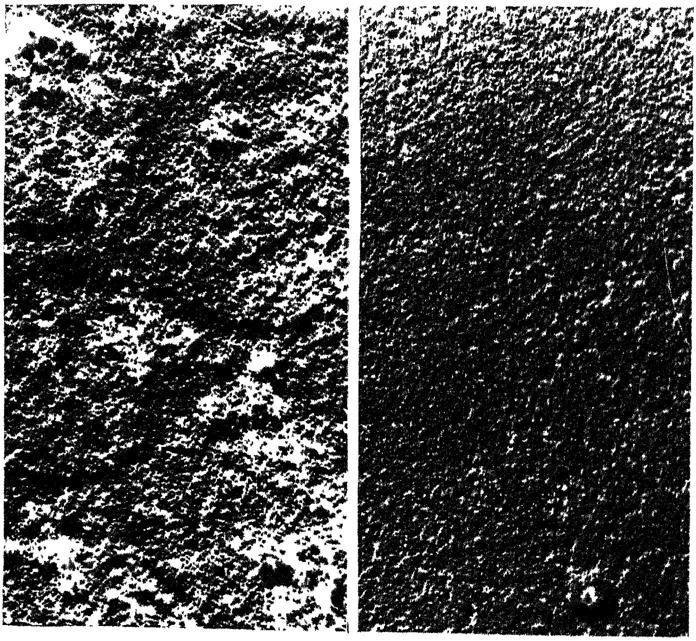

Figure 10. Untreated enamel etched 5 seconds with 0.1 N HCl. Left: faint rod pattern. Right: no change in structure. (7,200X).

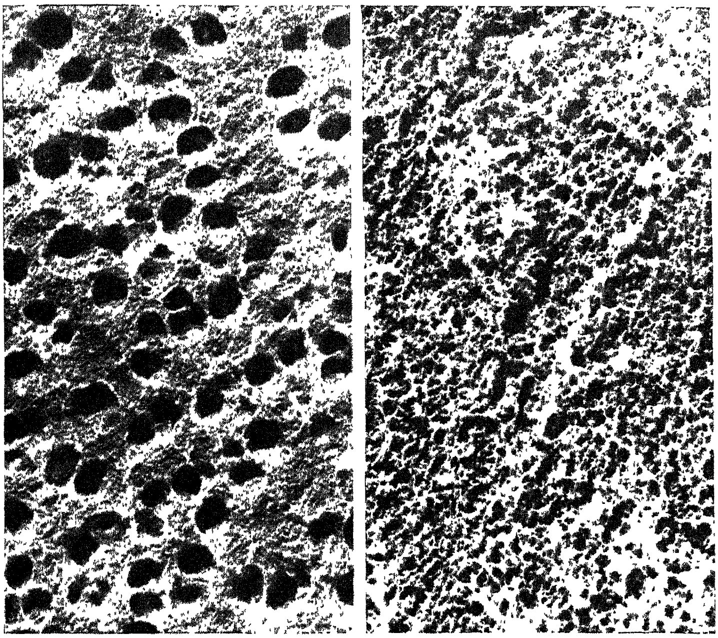

Figure 11. Pre-etched enamel immersed in NaF for 30 days. (7,200X).

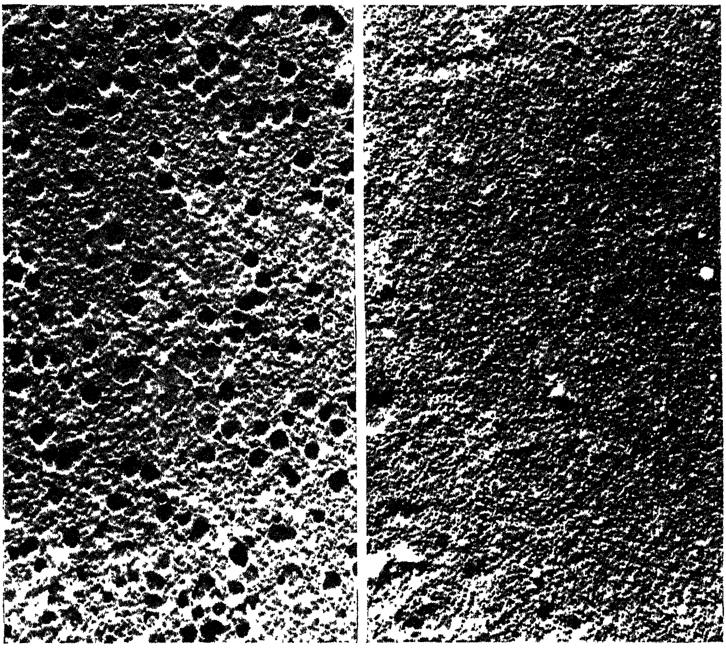

Figure 12. Enamel immersed 30 days in NaF and etched 5 seconds with 0.1 N HCl. (7,200X).

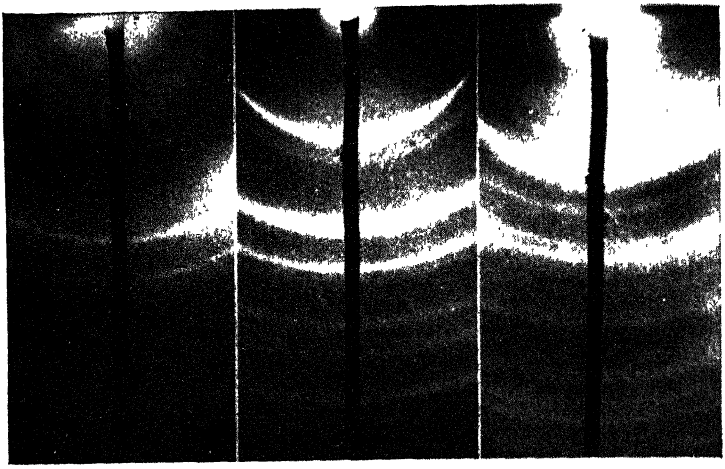

Figure 13. Diffraction patterns from untreated enamel (left); from enamel treated with NaF (center); and from CaF_2 (right).

solutions, it has failed to show changes after the shorter treatments that are of clinical significance. Changes resulting from these short treatments can, however, be demonstrated through electron diffraction.

Taking advantage of the ease and precision with which the new RCA type EMD electron diffraction unit can provide electron diffraction patterns from the surfaces of solid objects, we have used it to follow chemical changes in the surfaces of enamel slabs which have been treated by NaF in a fashion identical to those studied by electron microscopy. Such diffraction studies of enamel surfaces have a twofold advantage over diffraction studies using powdered enamel. They permit a direct comparison with the results of electron microscopy since patterns can be obtained from a surface before and after treatment, and from the exact surface that is to be replicated for microscopy. They also allow determination of chemical changes that may be brought about in enamel by the relatively short exposures to NaF that are clinically feasible.

In a first diffraction experiment, 30 enamel slabs were immersed in 2 percent NaF and 10 in distilled water, both for 30 days. At the end of this time, the specimens were washed for 1 minute in water, dried, and electron diffraction patterns made from their surfaces. The pattern obtained from untreated enamel was that of apatite (fig. 13, left), while a completely different pattern was obtained from the specimens treated with NaF (fig. 13, center). This pattern has been identified as that of CaF_2, both by measurement of the observed spacings and by comparison with patterns from CaF_2 itself (fig. 13, right). The CaF_2 pattern was given by all the treated specimens, although, when replicas of the surfaces of the slabs were examined under the electron microscope, the usual variety in appearance and quantity of visible deposit was noted.

After experimenting with progressively shorter immersion periods in NaF, it was found that the apatite pattern is replaced by that of CaF_2 after as short an exposure as 3 minutes. This was demonstrated through an experiment in which patterns were taken from the surfaces of 28 enamel slabs before and after 3 minutes' immersion in 2 percent NaF; in all cases the CaF_2 pattern was present after the treatment. Replicas of 12 of these surfaces were then examined under the electron microscope and no deposit could be detected.

Preliminary washing experiments were performed similar to those in the electron microscopic studies. Patterns were taken from the surfaces of 12 specimens before and after a 3-minute immersion in 2 percent NaF. They indicated that the surface of every specimen had become microcrystalline CaF_2. These slabs were then washed in circulating water and new patterns made after 15 and 90 minutes. The CaF_2 pattern was invariably present after the shorter period, but after 90 minutes every pattern had reverted to the apatite pattern obtained before treatment with NaF.

It is apparently more difficult to bring about the reversion of the CaF_2 pattern to the apatite pattern in specimens which have been immersed for long periods in NaF. Thus 12 specimens, which gave CaF_2 patterns after 30 days' immersion in 2 percent NaF, were washed for 6 days in water and, at the end of this time, 9 of the slabs still yielded the CaF_2 pattern while the other 3 gave that of apatite.

These observations demonstrate that there is a definite modification of the surface of enamel treated with NaF for periods as short as 3 minutes. Taken in connection with the microscopic studies, they show that this alteration is superficial and that prolonged exposures are necessary before definite visible changes in surface structure can be recognized, even under the high magnifications of the electron microscope. These facts, together with the relatively short time required to wash it away, clearly show the thinness of the CaF_2 layer that is formed after short treatments with NaF.

Summary

Electron micrographs have been made of replicas of the surfaces of enamel slabs treated with NaF solutions for lengths of time between 5 minutes and 30 days. Few visible surface changes were recognized when the treatment was less than a week. Small amounts of deposit were noted after 7 days. Greater quantities were seen after 15- and 30-day treatments. It was not visible after the prolonged washing of 30-day treated specimens. Preliminary but inconclusive tests were made of the relative acid solubilities of untreated enamel and enamel after immersion in NaF.

Electron diffraction patterns have been made from the surfaces of enamel slabs before and after immersion in NaF for periods from 3 minutes to 30 days. In all instances the original apatite pattern was converted to that of CaF_2. The CaF_2 pattern reverted to that of apatite when specimens treated for 3 minutes with NaF were washed for 90 minutes in water, but when specimens treated for 30 days were washed for 6 days the reversion did not occur in all instances. Electron micrographs of surfaces after diffraction showed amounts of deposit to be expected from the treatments they had undergone.

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Serological Survey for Murine Typhus Infection in Southwest Georgia Animals

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and JOSEPH H. SCHUBERT, PH. D.*

Detailed studies of domestic rats were conducted during the evaluation of county-wide DDT dusting operations in murine typhus control (*1*). In addition to information regarding the prevalence of typhus in the principal rat reservoir, data were obtained to contribute toward a determination of any supplemental reservoir of typhus among other animals. From October 1945 through January 1949, sera for the typhus complement fixation test were collected from a wide variety of animals. Most of the animals were collected in Decatur, Grady, Thomas, and Brooks Counties, with a few from the nearby and similar Cook and Berrien Counties.

Recent observations of murine typhus in Georgia have been reported by Bowdoin (*2*) and Boston (*3*). References to literature prior to 1938 are given by Brigham and Dyer (*4*) who list animals found by various workers to be susceptible to infection with either epidemic or endemic typhus as follows: monkey, guinea pig, rabbit, gray rat, white rat, white mouse, gerbil, ground squirrel (*Citellus citellus*), squirrel (Xerus [*atlantoxerus*] *getulus*), dog, cat, meadow mouse (*Arvicola arvalis*), dwarf mouse (*Mus minutus*), garden mouse, wood mouse, hedgehog, and pigeon.

On the basis of re-isolation of the laboratory inoculated Wilmington strain, Dyer (*5*) and Brigham (*6*, *7*, *8*) reported the following species of animals to be susceptible to infection with murine typhus rickettsiae:

1. Opossum, *Diedelphis virginiana.*
2. Old-field mouse, *Peromyscus polionotus polionotus.*
3. Cotton mouse, *Peromyscus gossypinus gossypinus.*
4. Cotton rat, *Sigmodon hispidus hispidus* (=*S. hispidus komareki*).
5. Rice rat, *Oryzomys palustris palustris.*
6. House mouse, *Mus musculus musculus.*
7. Cottontail rabbit, *Sylvilagus floridanus mallurus.*
8. Skunk, *Mephitis elongata.*
9. Fox squirrel, *Sciurus niger niger.*
10. Golden mouse, *Peromyscus nuttalli aureolus.*
11. Flying squirrel, *Glaucomys volans saturatus.*

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* Sanitarian (R), Surgeon, and Scientist, respectively, Communicable Disease Center, Atlanta, Ga. This study from the Typhus Investigations Project at Thomasville, Ga., was made cooperatively with the Georgia Department of Public Health, C. D. Bowdoin, M. D., Director, Division of Preventable Diseases, and Roy J. Boston, Director, Typhus Control Service.

12. Gray squirrel, *Sciurus carolinensis carolinensis.*
13. Cat, *Felis domestica.*[1]
14. Wood rat, *Neotoma floridana rubida.*
15. Swamp rabbit, *Sylvilagus aquaticus aquaticus.*
16. Woodchuck, *Marmota monax monax.*
17. Meadow mouse, *Microtus pennsylvanicus pennsylvanicus.*
18. Whitefooted mouse, *Peromyscus leucopus noveboracensis.*
19. Chipmunk, *Tamias striatus striatus.*

One or more sera collected in southwest Georgia from animals of the first nine species listed were found positive to the complement fixation test for murine typhus fever. All sera from species 10 through 14 were negative to the typhus complement fixation test. The remaining animals listed are not known to occur in the Typhus Investigations study area.

Brigham (*7*, *8*) reported the raccoon, *Procyon lotor lotor*, and the gray fox, *Urocyon cinereoargenteus cinereoargenteus*, to be insusceptible to murine typhus. This finding was strengthened by serological evidence obtained in the Georgia survey where different subspecies of the raccoon and fox were found to be negative to the typhus complement fixation test.

After inoculation of wild rodents with passage strains of endemic typhus, Lillie, Dyer, and Topping (*10*) observed characteristic reactions in brains of the following animals: *Peromyscus polionotus*, *P. leucopus*, *P. eremicus*, *P. maniculatus*, *Reithrodontomys* sp., *Mus musculus*, and *Rattus norvegicus*.

Brigham (*11*) reported the recovery of endemic typhus virus from an old-field mouse, *Peromyscus polionotus polionotus*, which was trapped on rural premises in the southeastern part of Alabama.

Irons et al. (*12*, *13*) report the recovery of endemic typhus rickettsiae from individual pools of the common cat flea, *Ctenocephalides felis*, taken from kittens, opossums, and puppies; and from a pool of the oriental rat flea, *Xenopsylla cheopis*, from a kitten. Mazzotti and Varela (*14*) tested 24 Mexico City dogs for the Weil-Felix reaction with *Proteus* OX 19 and reported that 10 sera reacted at a dilution of 1 : 20, 10 at 1 : 40, and 4 at 1 : 80.

In working with experimental typhus infection in the eastern cotton rat, *Sigmodon hispidus hispidus*, Anderson (*15*) found sera from recovered rats had neutralizing, complement fixing, and antitoxic antibodies, but no agglutinins for *Proteus* OX 19.

Using the complement fixation test for endemic typhus and tissue inoculations into guinea pigs, Beck and van Allen (*16*) found naturally infected California specimens of *Rattus norvegicus*, *R. rattus*, *R. alexandrinus*, and *Mus musculus*. Other California animals tested with negative results included *Citellus fisheri*, *C. beecheyi*, *Sigmodon hispidus*

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[1] This finding was in confirmation of previous work by Lépine and Lorando (*9*).

eremicus, *Citellus tereticaudus tereticaudus*, *Neotoma albigula*, *Neotoma fuscipes macrotis*, *Ammospermophilus leucurus*, *Dipodomys deserti*, *Peromyscus eremicus eremicus*, cat, ground owl, and gopher. Their experimental inoculation of *Citellus beecheyi* demonstrated this ground squirrel may be infected with a murine strain of typhus fever.

In addition to those animals previously shown to be susceptible, the Georgia survey found sera from the weasel and blue jay positive to the murine typhus complement fixation test.

Although 3,202 specimens were examined serologically, the survey was definitely limited through difficulty of collection in the less common species. Small numbers of several species were obtained by chance collection in traps set for other animals. While negative results on small numbers of specimens have no significance, they are reported as a contribution toward the eventual objective of determining the extent of any supplemental reservoir of murine typhus. The serological evaluation is limited by the lack of any strain isolation studies in conjunction with the survey.

Methods

From October 1945 to January 1947 small numbers of miscellaneous animals were caught by chance in number 0 steel traps that had been set in buildings for collection of domestic rats. This chance collection continued, and, in addition, during 1947 and 1948, two men were assigned to the collection of small mammals in rural areas of the four-county Typhus Investigations study area. Native rats and mice were caught in several types of live traps, including a box trap with gravity drop hardware cloth doors at each end, the modified rabbit box trap described by Richter and Emlen (*17*), and a box trap described by Hubbard (*18*). Opossums and many of the carnivorous mammals were caught in number 0 to number 2 steel traps. Many of the squirrels and rabbits were collected with a shotgun.[2]

While a few specimens of wildlife were collected from farm buildings, collections were predominately from the fields and woods. Since house mice are often found in field habitats and domestic rats are only infrequently found away from man-made harborage, it is apparent that there is some but not extensive overlapping of ecological areas. Collection records indicate a limited exchange of ectoparasite species among domestic rats and several native mammals. The opossum, cotton rat, wood rat, and the spotted skunk were occasionally trapped in rural barns. Cotton rats were easily collected in large numbers in broom sedge fields.

Many of the small mammals were brought alive to the Thomasville laboratory where they were anesthetized and bled directly from the heart with a sterile glass pipette. Animals killed in the field with a gun were bled with a sterile syringe. The blood was centrifuged twice and serum sent to the Communicable Disease Center Serological Laboratory for complement fixation test. Chicken blood was obtained at poultry houses supplied from rural sections of Decatur, Grady, and Thomas Counties. Dog blood was obtained for the most part from Thomas County through the cooperation of local veterinarians.

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[2] The authors are indebted to E. V. Komarek (*19*) for valuable aid and advice in the collection and determination of mammals.

The complement fixation technique used throughout the survey was developed by Bengtson (*20*). Serial twofold dilutions from 1:4 to 1:1024 of inactivated serum in 0.2 cc. amounts were employed, to which were added 4 units of antigen in 0.2 cc., and 2 full units of complement in 0.2 cc. Fixation was allowed to proceed for 1 hour in the water bath at 37° C. Sensitized sheep erythrocytes consisting of 2 hemolytic units of hemolysin in 0.2 cc. mixed with an equal volume of 2 percent suspension of washed sheep erythrocytes were then added. The tubes were further incubated for 1 hour in the water bath at 37° C. Appropriate serum and antigen controls, as well as positive and negative sera, were included with the test. Positive results were reported from the highest serum dilution which gave 3 or 4 plus fixation. The antigen was a purified soluble product prepared from murine typhus-infected yolk sacs by the ether extraction process.

Results

Results of the complement fixation tests are shown in table 1. Of the 12 species that yielded positive sera, samples of over 100 specimens were obtained from only seven species (opossum, cottontail, house mouse, cotton mouse, old-field mouse, cotton rat, and Florida skunk). Among these seven species the percentage of positive sera varied from 0.5 for the cottontail to 2.7 for the cotton rat. In comparison, domestic rats from untreated Grady County during a similar period averaged about 38 percent positive to the complement fixation test. Thus, these limited results tend to show a very low incidence of typhus in animals other than domestic rats.

Available data are inconclusive as to whether or not typhus in wildlife has been affected by the DDT dusting of domestic rat harborages conducted during 1946 and 1947 in Thomas and Brooks Counties (*1*, *21*). For example, of the cotton rats collected in 1947 from Decatur and Grady Counties where there was no dusting program, over 4 percent were positive while only 2 percent of those collected in dusted Thomas and Brooks Counties were positive. In 1948, about 0.6 percent of the cotton rats from Decatur and Grady Counties were positive while 1.6 percent of these animals from Thomas and Brooks Counties were positive.

The negative results that were obtained from small numbers of

Table 1. *Results of complement fixation tests for murine typhus fever*

Animal	Number examined	Number positive	Percent positive
Class Mammalia			
Florida opossum, *Didelphis virginiana pigra* Bangs	345	3	0.9
Little brown bat, *Myotis lucifugus lucifugus* (LeConte)	2	0	0
LeConte free-tailed bat, *Tadarida cynocephala* (LeConte)	3	0	0
Seminole red bat, *Lasiurus borealis seminola* (Rhoads)	1	0	0
LeConte lump-nosed bat, *Corynorhinus macrotis* (LeConte)	1	0	0
Eastern cottontail, *Sylvilagus floridanus mallurus* (Thomas)	199	1	0.5
Marsh rabbit, *Sylvilagus palustris palustris* (Bachman)	21	0	0
Southeastern flying squirrel, *Glaucomys volans saturatus* Howell	1	0	0
Southern gray squirrel, *Sciurus carolinensis carolinensis* Gmelin	86	0	0
Southern fox squirrel, *Sciurus niger niger* Linnaeus	39	1	2.6
House mouse, *Mus musculus* Linnaeus	294	6	2.0
Eastern harvest mouse, *Reithrodontomys humulis humulis* (Audobon and Bachman)	2	0	0
Swamp rice rat, *Oryzomys palustris palustris* (Harlan)	25	1	4.0
Cotton mouse, *Peromyscus gossypinus gossypinus* (LeConte)	235	5	2.1
Old-field mouse, *Peromyscus polionotus polionotus* (Wagner)	217	1	0.5
Southern golden mouse, *Peromyscus nuttalli aureolus* (Audubon and Bachman)	4	0	0
Eastern cotton rat, *Sigmodon hispidus komareki* (Say and Ord)	841	23	2.7
Florida wood rat, *Neotoma floridana floridana* (Ord)	36	0	0
Pine mouse, *Pitymys pinetorum pinetorum* (LeConte)	4	0	0
Florida raccoon, *Procyon lotor elucus* Bangs	102	0	0
Florida bobcat, *Lynx rufus floridanus* (Rafinesque)	2	0	0
Cat, *Felis domestica*	220	0	0
Dog, *Canis familiaris*	56	3	5.4
Florida gray fox, *Urocyon cinereoargenteus floridanus* Rhoads	14	0	0
Spotted skunk, *Spilogale putorius* (Linnaeus)	101	0	0
Florida skunk, *Mephitis elongata* (Bangs)	109	1	0.9
Southern weasel, *Mustela noveboracensis notia* (Bangs)	3	1	33.3
Class Aves			
Domestic duck, *Anas boschas*	2	0	0
Bob-white quail, *Colinus virginianus*	1	0	0
Common hen, *Gallus gallus*	209	0	0
Domestic turkey, *Mellagris gallapava*	1	0	0
Domestic pigeon, *Columbia livia*	4	0	0
Mourning dove, *Zenaidura macroura*	1	0	0
Screech owl, *Outs asio*	4	0	0
Great horned owl, *Bubo virginianus*	2	0	0
Blue jay, *Cyanocitta cristata*	12	1	8.3
Brown thrasher, *Toxostoma rufum*	3	0	0

various species collected does not necessarily indicate that infection does not occur in these species. A sufficient number of sera were obtained from the gray squirrel, raccoon, domestic cat, and common hen to indicate that if these animals are naturally infected, the prevalence of demonstrable antibodies is not very high.

The number of positive animals was too small to make valid comparison of prevalence in the various counties. Of the 47 sera that were positive to the complement fixation test for murine typhus, 15 were collected in Decatur County (9 cotton rats, 1 opossum, 2 cotton mice, 1 house mouse, 1 cottontail, and 1 Florida skunk), 5 were from Grady County (4 cotton rats and 1 blue jay), 18 were from Thomas County (8 cotton rats, 2 opossums, 3 cotton mice, 1 house mouse, 1 fox squirrel, and 3 dogs), 5 were from Brooks County (3 house mice, 1 old-field mouse, and 1 rice rat), 2 were from Cook County (cotton rats), and 2 were from Berrien County (1 house mouse and 1 weasel).

Although the weasel and blue jay are not known to be susceptible to murine typhus, the titers of positive sera, shown in table 2, are certainly suggestive of a previous natural infection in these animals. The indication of natural infection among the other animals found positive is strengthened by the knowledge of their susceptibility to typhus.

Table 2. *Titers of animal sera positive to the complement fixation test for murine typhus*

Source of sera	Titer						
	1:8	1.16	1:32	1.64	1:96	1:128	1:1024
Florida opossum	1	--------	2	--------	--------	--------	--------
Eastern cottontail	1	--------	--------	--------	--------	--------	--------
Southern fox squirrel	--------	--------	1	--------	--------	--------	--------
House mouse	3	1	2	--------	--------	--------	--------
Swamp rice rat	--------	--------	--------	1	--------	--------	--------
Cotton mouse	3	2	--------	--------	--------	--------	--------
Old-field mouse	1	--------	--------	--------	--------	--------	--------
Eastern cotton rat	10	5	4	1	1	1	1
Dog	2	1	--------	--------	--------	--------	--------
Florida skunk	1	--------	--------	--------	--------	--------	--------
Southern weasel	1	--------	--------	--------	--------	--------	--------
Blue jay	--------	--------	1	--------	--------	--------	--------

Summary

In a limited survey of southwest Georgia animals, exclusive of domestic rats, 3,202 sera from 37 species were examined by the complement fixation test for murine typhus. A low level of natural infection was indicated by the finding of 47 positive sera from 12 species of animals including the opossum, cottontail, fox squirrel, house mouse, rice rat, cotton mouse, old-field mouse, cotton rat, dog, Florida skunk, weasel, and blue jay.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED DECEMBER 24, 1949

For the eighteenth consecutive week the total reported incidence of poliomyelitis in the Nation decreased from the preceding week. The total number of cases reported is 154 as compared with 243 last week and 90 for the 5-year (1944–48) median. Five States reported an aggregate increase from the preceding week of 13 cases ranging from 1 in 2 States to 5 (from 18 to 23) in Michigan. Twenty-five States reported an aggregate decrease of 102 cases, ranging from 1 in 7 States to 16 (from 28 to 12)in New York.

Compared with last week, increases occurred in infectious encephalitis (from 7 to 12), measles (from 1,774 to 2,008) and typhoid fever (including paratyphoid fever) (from 33 to 52). In addition, the cumulative totals for these diseases are slightly above those for the corresponding period last year. Other than the above mentioned, no other notifiable disease increased over the preceding week. Diphtheria, influenza, scarlet fever and whooping cough in addition to decreases for the week, showed decreases in the cumulative totals for the year as compared with the corresponding period last year.

One case of anthrax was reported in Pennsylvania. No cases of smallpox were reported in the United States. Hawaii reported 551 cases of influenza.

Of 41 States and the District of Columbia reporting on rabies in animals, 23 States and the District of Columbia reported no cases, while the remaining 18 reported a total of 103 cases. The States reporting the largest numbers were Texas (23), Georgia (11), West Virginia (11) and New York (10). The total number of rabies in animals reported to date is 5,553.

A total of 9,321 deaths was recorded during the week in 92 large cities in the United States, as compared with 9,315 last week; 8,833 and 8,737, respectively, for the corresponding weeks of 1947 and 1948; and 8,833 for the 3-year (1946–48) median. For the year to date the total is 463,177, as compared with 463,113 for the same period last year. Infant deaths for the current week totaled 627; for the last week, 591; for the corresponding week last year, 592; and the 3-year median, 642. The cumulative figure is 32,952, as compared with 33,640 for the corresponding period last year.

Telegraphic case reports from State health officers for week ended Dec. 24, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	------	------	------	46	------	13	------	------	13	------	------	------	10	------
New Hampshire	------	------	------	------	------	5	------	------	1	------	------	------	------	------
Vermont	------	1	------	1	------	------	------	------	8	------	------	------	9	------
Massachusetts	5	------	------	15	1	------	2	------	59	------	------	------	84	------
Rhode Island	------	------	1	------	------	5	------	------	4	------	------	------	4	------
Connecticut	------	------	1	20	4	52	4	------	15	------	------	1	82	------
MIDDLE ATLANTIC														
New York	9	------	(2)	154	2	259	12	------	[3] 64	------	------	5	154	10
New Jersey	2	1	1	97	------	60	2	------	18	------	------	------	112	------
Pennsylvania	1	1	------	66	7	72	2	------	76	------	------	1	156	1
EAST NORTH CENTRAL														
Ohio	6	------	------	34	5	40	------	------	124	------	2	------	102	3
Indiana	2	------	------	7	------	9	------	------	20	------	------	1	8	4
Illinois	------	1	1	28	3	62	7	------	32	------	5	2	55	3
Michigan [4]	3	4	1	449	4	38	23	------	87	------	1	2	172	5
Wisconsin	------	------	15	44	------	9	16	------	49	------	------	2	100	------
WEST NORTH CENTRAL														
Minnesota	2	1	------	53	------	6	2	------	18	------	------	1	13	1
Iowa	1	2	------	172	------	1	5	------	11	------	------	------	2	5
Missouri	------	------	------	------	1	2	3	------	12	------	2	------	6	------
North Dakota	------	------	------	3	------	------	------	------	12	------	------	------	3	------
South Dakota	------	------	------	4	------	1	1	------	------	------	------	------	1	------
Nebraska	------	------	10	1	------	4	1	------	17	------	------	1	4	------
Kansas	------	------	20	1	------	13	4	------	22	------	------	------	12	------
SOUTH ATLANTIC														
Delaware	------	------	------	1	2	------	1	------	2	------	------	1	6	------
Maryland [4]	2	------	1	10	1	38	1	------	18	------	1	------	43	------
District of Columbia	2	------	------	24	------	10	------	------	3	------	------	------	1	------
Virginia	2	------	224	8	1	74	1	------	18	------	4	------	11	2
West Virginia	3	------	12	15	3	7	------	------	9	------	2	1	7	11
North Carolina	8	------	------	42	3	------	2	------	54	------	1	------	7	------
South Carolina	------	------	22	19	------	16	------	------	4	------	------	------	------	6
Georgia	3	------	170	1	------	17	------	------	13	------	2	------	6	11
Florida	3	------	9	11	------	17	2	------	7	------	------	1	------	------
EAST SOUTH CENTRAL														
Kentucky	4	------	------	2	2	------	5	------	16	------	------	------	------	------
Tennessee	6	------	17	22	4	69	3	------	34	------	1	4	11	8
Alabama	6	------	28	6	2	46	2	------	19	------	------	1	2	4
Mississippi [4]	1	------	------	9	1	4	2	------	1	------	1	------	1	------

See footnote at end of table.

Telegraphic case reports from State health officers for week ended Dec. 24, 1949—Continued

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
WEST SOUTH CENTRAL														
Arkansas	8	--------	78	2	1	49	--------	--------	2	--------	4	3	16	1
Louisiana	3	--------	5	4	--------	21	1	--------	4	--------	--------	3	--------	--------
Oklahoma	3	--------	50	9	--------	19	2	--------	5	--------	--------	--------	4	2
Texas	16	--------	1,469	26	4	283	6	--------	43	--------	--------	4	62	23
MOUNTAIN														
Montana	1	--------	--------	29	--------	--------	2	--------	4	--------	3	--------	--------	--------
Idaho	2	--------	7	2	--------	18	3	--------	3	--------	--------	--------	--------	--------
Wyoming	--------	--------	--------	4	--------	--------	--------	--------	1	--------	--------	--------	--------	--------
Colorado	3	--------	19	106	--------	13	3	--------	9	--------	--------	--------	19	--------
New Mexico	1	--------	1	83	--------	12	1	--------	4	--------	1	1	8	--------
Arizona	3	--------	119	34	1	15	1	--------	9	--------	1	3	7	--------
Utah [4]	1	--------	--------	85	--------	1	3	--------	2	--------	1	--------	12	--------
Nevada	1	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
PACIFIC														
Washington	1	--------	--------	144	1	--------	1	--------	52	--------	--------	--------	15	--------
Oregon	--------	--------	4	37	1	9	4	--------	26	--------	--------	--------	16	--------
California	4	1	4	78	3	26	24	--------	59	--------	--------	14	51	3
Total	118	12	2,289	2,008	57	1,415	154	--------	1,083	--------	32	52	1,394	--------
Median, 1944–48	319	5	3,338	2,696	55	--------	90	1	1,956	4	38	41	1,541	--------
Year to date, 51 weeks	7,868	750	103,777	604,870	3,360	75,987	[5] 42,184	560	[6] 72,891	48	1,106	3,592	66,668	--------
Median, 1944–48	13,795	615	334,374	596,757	5,584	--------	19,196	522	111,108	332	1,003	3,966	98,565	--------
Seasonal low week ends	(27th) July 9	--------	(30th) July 30	(35th) Sept. 3	(37th) Sept. 17	--------	(11th) Mar. 19	--------	(32nd) Aug. 13	(35th) Sept 3	--------	(11th) Mar. 19	(39th) Oct. 1	--------
Since seasonal low week	4,100	--------	27,910	16,352	844	--------	[5] 41,269	--------	[6] 14,631	7	--------	3,132	20,066	--------
Median, 1944–45 to 1948–49 [7]	7,265	--------	32,861	23,401	918	--------	18,933	--------	24,813	53	--------	3,491	22,690	--------

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[1] Including paratyphoid fever currently reported separately as follows Connecticut 1; Louisiana 2; Texas 1; California 10. Cases reported as salmonella infection not included in the table were as follows: Massachusetts 1; New York 5; Pennsylvania 1

[2] New York City only. [3] Including cases reported as streptococcal sore throat. [4] Period ended earlier than Saturday.

[5] Deductions—Michigan: 1 case, week ended Sept. 10. 2 cases, week ended Sept. 24. Mississippi. 2 cases, week ended Nov. 19. Additions—Kentucky: 10 cases not assignable to specific weeks, July, 4 cases; October, 4 cases; and November, 2 cases.

[6] Figures have been adjusted to exclude streptococcal sore throat, excepting those of New York.

[7] The median of the 5 preceding corresponding periods (1944–45 to 1948–49).

Anthrax: Pennsylvania 1 case. Alaska: Measles 20. Hawaii Influenza 551, measles 1.

PLAGUE INFECTION IN KITTITAS COUNTY, WASH.

Under date of December 22, plague infection was reported in 123 fleas from 21 *Lagurus curtatus* (sagebrush voles) trapped December 13, 1949, on U. S. Highway 10, 18 miles east of Ellensburg, Kittitas County, Washington.

DEATHS DURING WEEK ENDED DEC. 24, 1949

	Week ended Dec. 24, 1949	Corresponding week, 1948
Data for 92 large cities of the United States:		
Total deaths	9,321	8,737
Median for 3 prior years	8,833	
Total deaths, first 51 weeks of year	463,177	463,113
Deaths under 1 year of age	627	592
Median for 3 prior years	642	
Deaths under 1 year of age, first 51 weeks of year	32,952	33,640
Data from industrial insurance companies:		
Policies in force	69,928,911	70,740,929
Number of death claims	12,277	12,153
Death claims per 1,000 policies in force, annual rate	9.2	9.0
Death claims per 1,000 policies, first 51 weeks of year, annual rate	9.1	9.2

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended December 3, 1949.—Cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox			54	1	193	395	109	72	90	125	1,039
Diphtheria					15		1	1			17
Dysentery:											
Amebic									1		1
Bacillary					1						1
Encephalitis, infectious							1				1
German measles			1		8	40	1		70	55	175
Influenza			16			6	1	1			24
Measles			15	1	165	123	114	163	65	269	915
Meningitis, meningococcal									1		1
Mumps			79		36	225	8	32	29	90	499
Poliomyelitis						2	1		2	2	7
Scarlet fever	3		5	7	76	30	36	6	45	10	218
Tuberculosis (all forms)	64		3	9	209	27	18	15		34	379
Typhoid and paratyphoid fever					3	1		1		1	6
Undulant fever					2	1	1			1	5
Venereal diseases:											
Gonorrhea	7		9	6	89	69	32	9	44	68	333
Syphilis	2		4	6	58	43	5	5	5	11	139
Other forms										1	1
Whooping cough			7		135	59	2	9		7	219

MADAGASCAR

Notifiable diseases—October 1949.—Notifiable diseases were reported in Madagascar and Comoro Islands during October 1949, as follows:

Disease	October 1949			
	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Beriberi			6	
Bilharziasis			76	1
Cerebrospinal meningitis			10	3
Diphtheria			7	2
Dysentery:				
Amebic	12		376	1
Bacillary	1			
Erysipelas			13	1
Influenza	64		3, 984	32
Leprosy	1		61	1
Malaria	332	1	30, 155	125
Measles			179	4
Mumps			139	
Plague			20	20
Pneumonia:				
Broncho	2	1	334	58
Pneumococcic			454	61
Poliomyelitis			2	1
Puerperal infection			5	1
Relapsing fever	1			
Trachoma	1			
Tuberculosis, pulmonary	1		118	21
Typhoid fever			4	3
Whooping cough	1		384	6

NORWAY

Notifiable diseases—September 1949.—Cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	13	Mumps	143
Diphtheria	21	Paratyphoid fever	1
Dysentery, unspecified	2	Pneumonia (all forms)	1, 409
Encephalitis, epidemic	3	Poliomyelitis	17
Erysipelas	384	Rheumatic fever	97
Gastroenteritis	3, 846	Scabies	1, 543
Gonorrhea	292	Scarlet fever	439
Hepatitis, epidemic	106	Syphilis	92
Impetigo contagiosa	2, 829	Tuberculosis (all forms)	283
Influenza	1, 795	Typhoid fever	4
Laryngitis	7, 883	Weil's disease	1
Malaria	3	Whooping cough	5, 050
Measles	780		

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Burma—Moulmein.—During the week ended November 12, 1949, 1 imported case of cholera was reported in Moulmein, Burma.

Ceylon.—Correction: According to information from Colombo, Ceylon, dated December 13, 1949, the 10 suspected cases of cholera reported in Eastern Province, week ended November 19, 1949 (see PUBLIC HEALTH REPORTS 64: 1629, December 16, 1949), have been determined not to be cholera cases, but suspected food poisoning. Eastern Province was stated to have been declared free from cholera as of December 6, 1949.

Plague

Belgian Congo—Costermansville Province.—On December 9, 1949, 1 fatal case of plague was reported in Malihi, northeast of Lubero, Costermansville Province, Belgian Congo.

Madagascar.—During the period November 21–30, 1949, 11 cases of plague, with 10 deaths, were reported in Madagascar.

Netherlands Indies—Java—Jogjakarta.—For the week ended December 3, 1949, 49 fatal cases of plague were reported in Jogjakarta Residency, Java. Twelve of these cases were reported in Jogjakarta City. For the week ended December 10, 1949, 15 cases, all fatal, were reported in Jogjakarta City.

Union of South Africa—Cape Province.—During the week ended December 3, 1949, 1 fatal suspected case of pneumonic plague was reported in Hay District, Cape Province, Union of South Africa.

Smallpox

Arabia—Jedda and Mecca.—During the week ended November 26, 1949, 15 cases of smallpox, with 3 deaths, were reported in Jedda, and 7 cases, with 2 deaths, in Mecca, Arabia.

India—New Delhi.—During the week ended December 10, 1949, 54 cases of smallpox, with 32 deaths, were reported in New Delhi, India.

Indochina (French)—Tonkin.—For the week ended December 10, 1949, 97 cases of smallpox were reported in Tonkin, French Indochina.

Pakistan—Chittagong.—During the week ended December 3, 1949, 10 cases of smallpox were reported in Chittagong, Pakistan, and 11 cases were reported during the week ended December 10.

Peru—Pacasmayo.—According to information dated December 29, 1949, an outbreak of smallpox has been reported in the port of Pacasmayo, Peru. No figures were given in the report as received.

Yellow Fever

Sierra Leone—Freetown.—On December 4, 1949, 1 fatal confirmed case of yellow fever was reported in the port of Freetown, Sierra Leone. The patient was stated to have come from Musaia, about 247 miles from Freetown. Death occurred in Freetown.

* * *

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

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Effects of DDT Mosquito Larviciding on Wildlife

IV. The Effects on Terrestrial Insect Populations of Routine Larviciding by Airplane

By HARVEY I. SCUDDER* and CLARENCE M. TARZWELL**

This report is the fourth in a series dealing with the effects on various forms of wildlife of routine DDT larviciding for mosquito control. It is based on studies made during 1946 and 1947 in the Savannah Migratory Waterfowl Refuge, Jasper County, Ga. The purpose of this investigation was to determine whether routine airplane larviciding would show any effect on the insect populations of terrestrial areas, situated adjacent to routinely larvicided bodies of water and over-lapped by the application and drifting of the larvicide.

Procedure

The Savannah Migratory Waterfowl Refuge lies within the lower Savannah River tidal bottoms, which are generally brackish; however, the areas studied were protected from tidal fluctuation and brackish water by a system of dikes. The dikes, islands, and vegetation of the area studied have been described by Erickson (*1*). During the latter part of 1945, ecological investigations of the dikes and islands were made and the species of vegetation identified and compared in order that stations might be selected in check and treated areas which would be comparable and so have similar insect faunas. Four similar islands and three dikes were selected for intensive study and for the erection of light traps for the sampling of insect populations before and after the routine airplane treatments.

The area selected for treatment included about 815 acres in four ponds, their adjoining islands and dikes, and a narrow zone around them. In the untreated portion of the refuge, two islands and the dikes around a large 850-acre pond were selected as check areas. Two of the treated ponds, 6 and 2, were routinely sprayed; the other two, 3 and 3A, received a thermal aerosol. Treatments were applied at weekly intervals and at a dosage of 0.1 pound of DDT per acre. The formulation used was a 20 percent solution (by weight) of technical grade DDT in a methylated naphthalene, Velsicol NR–70.[1] The sprays and aerosol treatments were applied with a Stearman PT–17 plane having a 220-horsepower Continental engine. The plane was equipped with a Venturi exhaust generator, similar to the one described by Krusé and Metcalf (*2*) for the distribution of thermal aerosols, and five nozzles for the application of sprays. During 1946, the pond 6 area received 17 applications; the pond 2 area, 16; and ponds 3 and 3A and their surrounding zone, 15 applications each. In the 1947 season, all treated areas received 20 applications. In applying the larvicide, the plane was flown along parallel flight lines at 100-foot intervals and at an elevation of about 30 feet.

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In order to determine the actual amount of DDT reaching the ground in areas where the insect populations were being studied, 3x12-inch glass sampling slides for the collection of the DDT sprays and aerosols were put out before treatment. These slides were collected after treatment and taken to the laboratory where the amount of DDT deposited on them was determined. The DDT recoverable from these slides was quantitatively determined by the Schechter-Haller colorimetric method. Six slides were placed at fixed stations on each of the dike and island areas studied. The average amount recovered from these slides after each treatment was considered as the actual amount reaching the ground. In the sprayed area, this amount varied from 13 to 88 percent of the amount discharged by the plane. According to the determinations made, the average calculated amount reaching the ground per spraying was 0.046 ± 0.021 pound per acre. In the areas receiving the thermal aerosols, the amount recovered varied from 1.3 to 18 percent, and the calculated average amount reaching the ground surface per application was 0.008 ± 0.002 pound of DDT per acre. It is thus apparent that the sprayed areas received almost six times as much DDT as the areas which received the aerosol. The total calculated deposit of DDT was 0.78 pound for the sprayed areas and 0.12 pound for the aerosoled areas during 1946.

Although the primary purpose of the study was to determine the effects of routine airplane mosquito larviciding with DDT on insects in bordering terrestrial areas into which the larvicide may have drifted, it was deemed desirable in the 1946 study to test the maximum likely effect by including direct treatment of these marginal study areas.

Several independent series of observations were made for the detection of the possible effects on terrestrial insects of these routine airplane applications of DDT sprays and aerosols for mosquito control. General field observations were made of the abundance of several species of insects in check and treated areas; post-treatment inspections of water areas were made for the detection of insects killed; aphid colonies were studied to determine any increase in their numbers or decrease in their predators; several hives of bees located within the treated area were observed and their honey production recorded; and light traps were set up in selected areas for sampling the night-flying insect populations before and after treatment.

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[1] This does not represent an endorsement of the product by the Public Health Service.

To determine whether or not the night-flying insect population was reduced in the marginal terrestrial areas included in the larviciding operations, seven light traps were operated at selected stations—three in check areas and four in treated areas. These traps were run the night before and the night after routine larvicidal treatment.

In 1946, the routine larvicidal treatments were made from May 28 to September 5. During this period insect collections were made before and after 12 routine treatments on the following dates: May 28 and 29; June 4, 5, 18, 19, 25, and 26; July 2, 3, 9, 10, 16, 17, 23, 24, 30, and 31; August 20, 21, 27, and 28; and September 4 and 5. Due to occasional mechanical failures, all seven traps were not operated on each of the above nights, but a total of 142 complete trap-night collections was obtained.

In 1947 the light traps were set up at the same stations used in 1946, but collections were made before and after only the last three routine larvicidal treatments. Collection dates were August 20, 21, 26, and 27, and September 3 and 4. The dates of these collections are practically the same as those made before and after the last three treatments of the 1946 season. Mechanical failure and other causes prevented full trap operation; however, a total of 26 trap-night collections was obtained.

The insects caught in each trap each night were classified according to order, counted, and weighed so certain comparisons could be made between check and treated areas after individual treatments and throughout the season.

The light trap used in this study (figs. 1 and 2) was a battery-operated trap designed by the senior author. This trap provides a means for obtaining good insect collections in areas where electric current is not available. The light source for the trap is a neon-style gas tube activated by a Model-T Ford coil and an automobile storage battery. The light trap consists of three tightly fitting but removable parts: a protecting hatch cover, a trap body having four glass-louvered windows, and a battery-box base.

Four feet of mercury-argon tubing make up the lighting element, suspended by three wires from the ceiling of the trap body. This is connected by insulated ignition wire to the Model-T Ford coil and switch which is attached on top of the trap body. Wires are strung down through one corner of the trap body and attached by clips to the battery in the battery box.

The trap body is protected from the weather by a hatch cover which

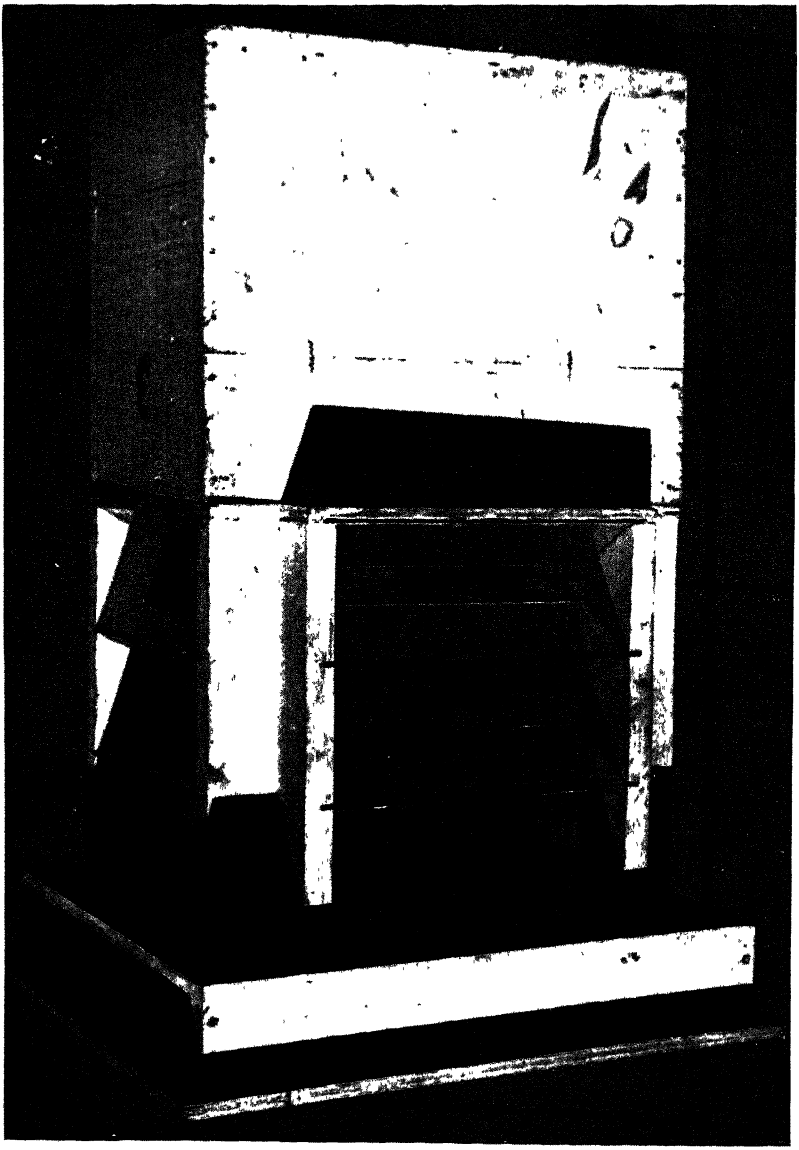

Figure 1. A weatherproof mercury-argon light trap with glass louvers operated by an automobile storage battery and used for quantitative sampling of night-flying insect populations.

is supported on upward prolongations of the four corner posts of the trap body, thus allowing ventilation for the coil beneath.

On each of the four sides of the trap, glass louvers afford two ingress openings, each 1½ inches wide, sufficient for large moths to pass, so a great variety of insects can be collected. A large funnel located directly beneath the light and fitted to the floor of the trap body leads

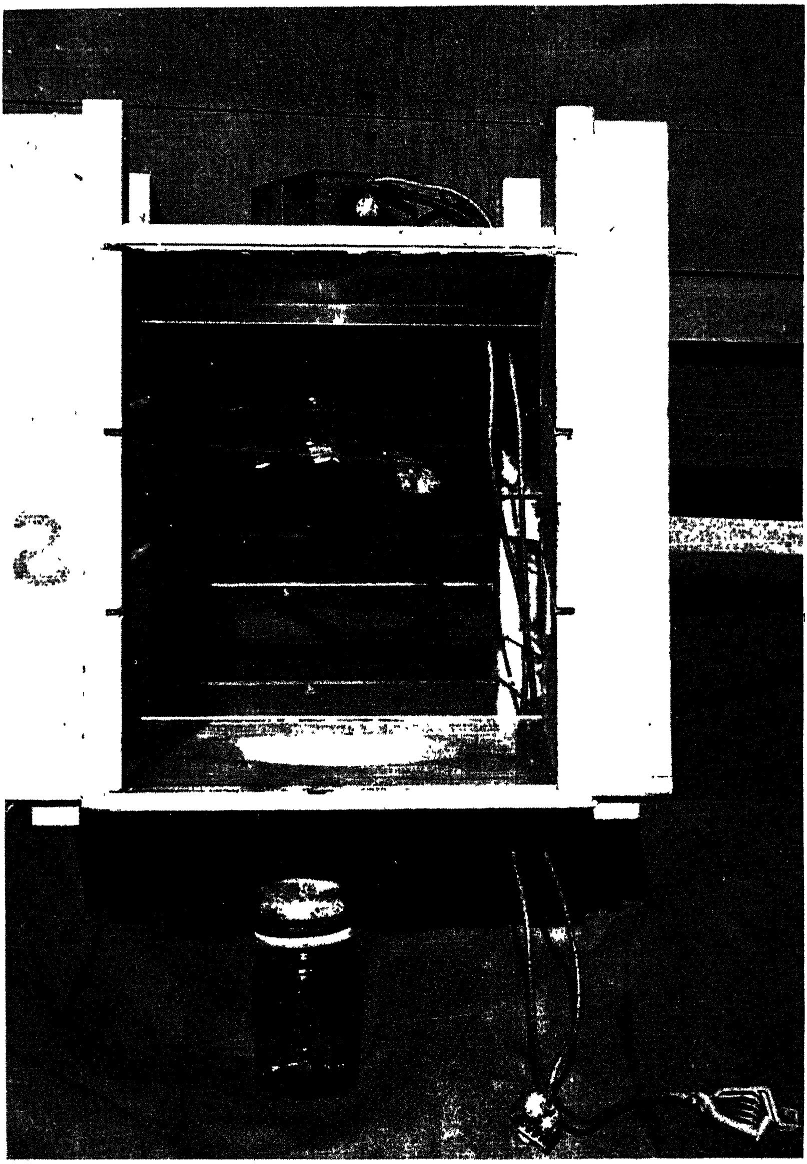

Figure 2. The light trap with protective hatch cover removed.

down to a 2-quart screw-topped killing jar, which is charged regularly with carbon tetrachloride. The collecting funnel with its attached jar extends downward beside the battery in the battery box.

The battery box is provided with only a partial bottom, sufficient for the battery, while the rest is open below to permit changing the poison jars, which can be reached easily through the bottom of the box and unscrewed from a ring lid soldered to the funnel.

The entire trap has proved to be weatherproof and difficult to upset because of the weight of the included battery. Each trap was mounted on four posts in a fairly open place whether in woods or dike areas.

The traps were operated all night each night of operation. Because the batteries supplied energy sufficient for only two nights' operation, they had to be recharged for each week's run.

A special effort was made to obtain similar locations for the traps in both check and treated areas. Traps 1 and 2 were check traps placed on small islands in locations closely similar to those for traps 3 and 4, which were established on small islands in the sprayed area. Traps 5, 6, and 7 were located on the dikes in more open areas. Trap 5 was placed on the dike of pond 2 which was sprayed; trap 6 was set on the dike of pond 4 which was a check area, and trap 7 was located on the dike of pond 3 which received the thermal aerosol treatments. Data on each of the trap situations are summarized in table 1.

Table 1. *Light-trap situations*

Trap No.	Area treatment	Location	Situation	Local flora
1	None	Island 1	Partly wooded, well-drained.	*Quercus, Melia, Solidago, Morus.*
2	None	Island 2	Wooded, well-drained	*Liquidambar, Quercus, Ilex.*
3	DDT spray	Island 5	Open woods, low	*Liquidambar, Quercus Mocus, Sapium.*
4	DDT spray	(Pond 6) Island 6	Open woods, low	*Mocus, Quercus, Liquidambar.*
5	DDT spray	(Pond 2) Dike I	Water edge, open dike area.	*Salix, Baccharis, Sapium, Rubus.*
6	None	(Pond 4) Dike H	Water edge, open dike area.	*Salix, Rubus.*
7	DDT thermal aerosol.	(Pond 3) Dike G	Water edge, open dike area.	*Baccharis, Sapium, Rubus.*

Results

General Field Observations

During the spray season rather constant observation of both check and treated areas showed only those differences in general insect numbers and activity which could be considered due to differences in the respective ecological situations. No over-all effect of the treatments was observed.

Field observations on certain individual groups of insects did indicate reductions in their populations. Mosquitoes, deer flies, and sand flies were definitely reduced in numbers as attested by both those people living in the area and the scientific personnel who had worked there during the previous year (1945). The untreated area during the spraying seasons showed high deer fly and mosquito populations as expected from the previous year. In addition, the great numbers of midges (Diptera: Chironomidae) observed were moderate in the treated areas.

Deer Flies. Although deer flies (Tabanidae: *Chrysops* spp.) were observed to be common in the treated areas in late May and through June, they were distinctly more numerous just outside the treated area. The difference was so noticeable that it was attributed to the DDT treatment, since in the previous year (1945) the deer flies had been plentiful in all areas.

Aside from these insect groups, no other effects were noticeable, since grasshoppers, ants, dragonflies, damsel flies, wasps, bees, and other common forms appeared in usual abundance.

By diligent inspection a very few affected insects could be found crawling about after each spraying. Examination of the sprayed area (pond 6) showed only the following affected or dead specimens in 2 hours of inspection of the ground cover and of special 3-foot square traps placed out for the purpose:

Four soldier beetles (Coleoptera: *Chauliognathus* sp.).
One leaf beetle (Coleoptera: Chrysomelidae).
One flesh fly (Diptera: *Sarcophaga* sp.).
One parasitic fly (Diptera: Tachinidae).
Three midges (Diptera: Chironomidae).
Three ants (Hymenoptera: Formicidae).
One spider (Arachnida: Araneae).

This type of observation was discontinued because its value was not believed to justify the time required.

Horse-Guard Wasps. As indirect evidence of the normal abundance of aerial insects, it was noted that a colonial population of a few thousand highly predaceous horse-guard wasps (Hymenoptera: Sphecidae—*Stictia carolina*) seemed to thrive successfully on the open sandy high ground of an island marginal to the DDT-spray-treated area (pond 6), which received an average DDT deposit of 0.03 pound per acre as recorded from a glass panel in the area. The horse-guard wasps exhibited extreme activity over a 3-week period, May 25 to June 14, during which they policed a large well-defined area like a group of fighter planes, each jealously guarding the air over a fixed plot of ground having a radius of about 3 feet, and assailing any flying insect that ventured near. As this species of wasp is known to provision its solitary nests with horseflies and deer flies (Diptera: Tabanidae), these observations indicated that even on the tabanids, generally considered to be fewer in number in the treated areas, the treatment did not exercise an effect great enough to starve their natural predators, the horse guards. In addition, in spite of the treatment, no dead or affected specimens of the horse guards were found.

It is realized that searching the terrain for dead insects is difficult and uncertain, and that scavenging forms undoubtedly destroy many specimens before they would be found; but it is believed that any general decimation would have been observable. Consequently, aside from the few forms discussed, it was considered that no general effect of significant nature was produced by the treatment.

Insects Found Dead or Affected Shortly After Treatment. Seven post-treatment inspections were made of a selected area of sprayed water surface (pond 6), and the affected and dead insects were roughly classified (table 2). These inspections were made from a boat within 8 hours after treatment.

The section studied was a strip of water area partly covered with floating vegetation and extending between 10 feet and 30 feet from a cutgrass, *Zizaniopsis miliacea,* margined shore line. The aquatic vegetation present was principally white waterlily in fairly dense stands with a scattering of emergent vegetation.

The ecological factors varied greatly within the area sampled, and distances from shore strongly affected the distribution of the insects found. For these reasons, no quantitative data collecting was attempted, but the data given may serve to show the relative mortalities of groups of aerial insects common at that location.

It can be noted from table 2 that the insects most commonly found dead or dying after the DDT treatment were may flies (Ephemeroptera), damsel flies (Odonata: Zygoptera), *Donacia* (Coleoptera: Chrysomelidae), long-legged flies (Diptera: Dolichopodidae), and miscellaneous acalyptrate muscid flies (Diptera: Acalyptratae). Undoubtedly, a great many more were overlooked, and many were eaten by fish or other predators before the inspections were made, but these partial data are of interest in considering the very light dosage used in the tests.

In spite of the insects killed, there was no evidence of any general diminution of damsel flies and dragonflies on the wing, or of aquatic insects in general, all of which were abundant throughout the spray season.

Aphid Studies. Since higher DDT dosages have been shown to favor the aphid population by killing off their parasites and predators (*3*), a series of field observations was made in the early summer of

1946 to see if the low anopheline-larviciding dosage used in the current experiments would be enough to produce the same effect.

The aphid colonies chosen for study were those of the common goldenrod aphid, probably *Macrosiphum rudbeckiae* (Fitch), which abounds in the Savannah area and is conspicuous for its bright red colonies along the goldenrod stems. The active length or extent of the colony along the stem (roughly indicative of its vigor) and the

Table 2. *Insects and spiders dead*[1] *or affected by DDT, found on the surface of pond 6 within 8 hours after airplane treatment of the area with 0.1 pound DDT per acre as a spray*

Insect groups found dead or affected on water surface	Date of collection, 1946							Total number insects collected
	June		July		August		Sept.	
	11	18	16	23	13	27	4	
Orthoptera	0	0	0	0	0	0	0	0
Neuroptera: Chrysopidae	0	0	0	0	0	0	1	1
Ephemeroptera	11	2	4	2	1	0	1	21
Odonata:								
Anisoptera	1	--------	1	1	1	--------	1	5
Zygoptera	4	9	7	12	8	5	4	49
Hemiptera:								
Corixidae	0	0	0	0	1	0	1	2
Nepidae	1	0	0	0	0	0	0	1
Belostomatidae	0	0	0	1	1	0	0	2
Naucoridae	1	0	0	0	0	0	0	1
Homoptera:								
Cercopidae	0	0	0	1	0	0	0	1
Cicadidae	0	0	0	0	0	1	0	1
Coleoptera:								
Carabidae	1	0	0	0	0	0	0	1
Dytiscidae	0	0	2	1	1	1	1	6
Hydrophilidae	0	0	0	0	0	0	1	1
Coccinellidae	7	0	0	0	0	0	0	7
Chrysomelidae [2]	8	8	27	10	5	2	12	72
Curculionidae	0	0	0	1	0	0	1	2
Trichoptera	0	0	0	0	0	0	0	0
Lepidoptera:								
(Microlepidoptera)	0	0	0	0	0	2	0	2
Pyralididae	3	0	0	0	0	2	6	11
Geometridae	0	0	0	1	1	2	0	4
Noctuidae	0	0	0	0	0	0	4	4
Pieridae	0	1	0	0	0	0	0	1
Nymphalidae	0	0	0	0	1	0	0	1
Lycaenidae	0	0	0	0	0	0	1	1
Diptera:								
Tipulidae	0	0	0	0	1	0	0	1
Chironomidae	2	0	0	0	0	0	0	2
Bibionidae	0	0	0	0	1	0	0	1
Dolichopodidae	32	54	35	17	77	12	29	256
Empididae	0	0	0	0	0	2	1	3
Syrphidae	0	1	1	0	0	0	0	2
(Acalyptratae)	11	26	8	8	6	5	5	69
Hymenoptera:								
Formicidae	0	2	0	0	0	0	0	2
Andrenidae	0	0	0	0	0	0	1	1
Arachnida: *Araneae* (Spiders)	1	0	0	0	2	0	1	4

[1] Not necessarily killed by the DDT.
[2] All but one of these were *Donacia*.

identity and numbers of parasites and predators were noted in both an untreated and treated area (pond 6). No colony differences were observable either with respect to treatment or to location in either open or shaded areas (table 3).

The predators found in the colonies were larvae of coccinellids and chrysopids, while braconids were the chief aphid parasites.

Honeybee Studies. Five 10-frame hives of Italian honeybees, each hive weighing over 100 pounds, were kept under observation in the sprayed area (pond 6) to determine whether or not the treatment would affect them. These colonies had been placed in position the previous autumn (1945), at which time they were studied and determined to be vigorous and free from disease. The five colonies passed the winter in good condition in the mild Savannah climate.

Table 3. *Colonies of the goldenrod aphid,* **Macrosiphum rudbeckiae (Fitch),** *compared to show effects of several routine DDT spray treatments at 0.1 pound per acre*

Study area	Total number colonies examined	Colony locations		Colony length along stem in cm.		Colonies w/parasites and/or predators
		In sun	In shade	Average	Variation	
DDT treated	24	14	10	12.3	2.2-26.0	20
Untreated	30	10	20	11.9	3.2-25.8	20

The beehives were located in an open live oak grove, *Quercus virginiana,* on well-drained ground about 200 feet from the treated water area (pond 6). They were subjected to routine DDT surface deposits averaging 0.03 pound per acre with an upper extreme of 0.07 pound for one treatment as indicated by the chemical determination of DDT deposited on glass slides placed in the center of the bee yard. This dosage was about two-thirds of that determined for the adjacent open-water pond area. The points near the bee yard where the bees took water were also within the treated zone, but only about a quarter of their theoretical honey-flow area was estimated to be under treatment, since their range from the hive locations included a 250° sector of untreated swamp bordering the experimental area. Nevertheless, the treated area was the only impoundage in their range, and its richer flora must have been far more attractive than the surrounding tidal swamp.

During the period of treatment the bees showed no abnormalities in their activity which could be assigned to DDT. The number of dead bees about the colony entrances was never great and was considered normal for the colonies. Occasionally a few bees were seen to be in some kind of distress, but it could not definitely be determined as due to DDT.

During the spray season the colonies each produced several extract-

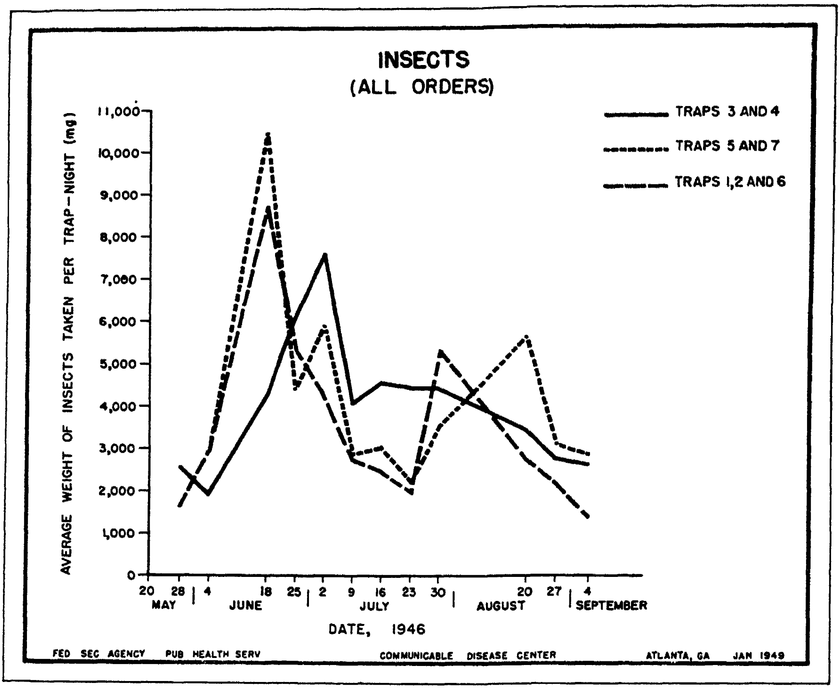

Figure 3. The average weight, in milligrams, of all insects taken per trap night in wooded island areas sprayed at the rate of 0.1 pound of DDT per acre (traps 3 and 4), in open-dike areas receiving 0.1 pound of DDT as a spray or aerosol (traps 5 and 7), and in check or untreated areas (traps 1, 2, and 6) during the period of study. Each point is the average of four or six trap-night catches.

ing frame supers with the exception of one colony which became weakened by an invasion of wax moths (probably the lesser wax moth, *Achroia grisella*). As the yard had a previous history of wax moth infestations, it was considered of no significance in estimating the effects of DDT. An experienced beekeeper examined the colonies during and at the close of the spray season (September 1946) and stated that the colonies had had a very successful year, regardless of the DDT treatment, and showed better honey production than expected for the season on the basis of other colonies in the Savannah area.

From these studies it was concluded that the routine airplane spraying at the rate of 0.1 pound of DDT per acre did not significantly affect the colony strength or honey production of honeybee colonies maintained adjacent to the treated water area. During the second and third years of routine larvicidal treatment in the refuge area, the beekeepers moved many additional colonies back into the sprayed areas. They obtained good honey production and reported no unusual killing of bees, which indicated that DDT mosquito larvicid-

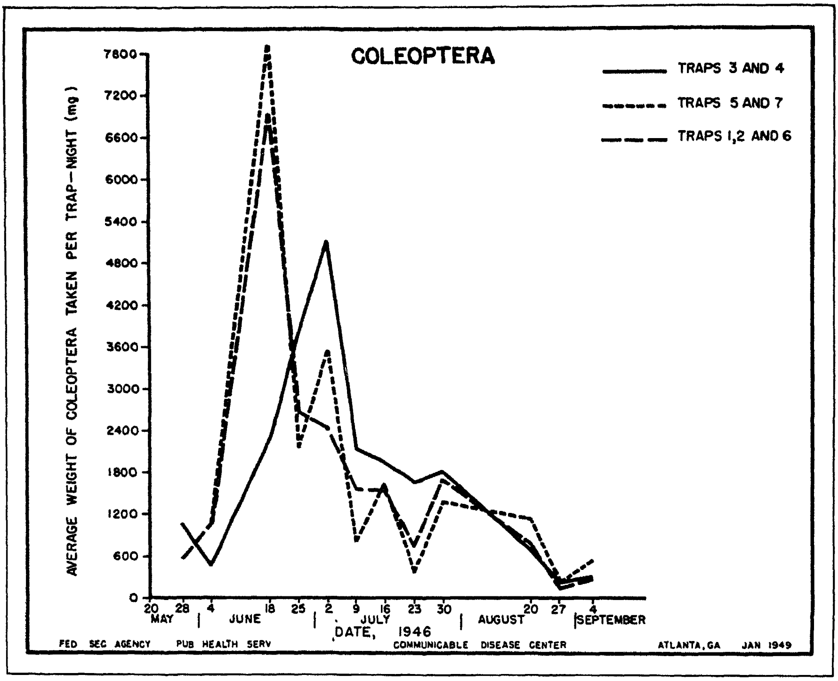

Figure 4. The average weight, in milligrams, of Coleoptera taken per trap night in wooded island areas sprayed at the rate of 0.1 pound of DDT per acre (traps 3 and 4), in open-dike areas receiving 0.1 pound of DDT as a spray or aerosol (traps 5 and 7), and in check or untreated areas (traps 1, 2, and 6) during the period of study. Each point is the average of four or six trap-night catches.

ing apparently is not significantly harmful to the honey industry.

Field studies carried out by Eide (*4*) have indicated that DDT when used as a 5-percent dust is much less toxic to bees than calcium arsenate or cryolite.

Light-trap Studies. Complete data from the seven light traps were obtained for a total of 142 trap nights in 1946. Of the total trap nights, 62 were in check areas, 61 in sprayed areas, and 19 in an area receiving a thermal aerosol. The average catch per trap night in the treated areas was 1,908 insects weighing 4.314 grams, while in the check areas it was 1,520 insects weighing 3.407 grams. In the sprayed areas, the average catch per trap night was 1,144 insects weighing 3.968 grams; in the area receiving the thermal aerosol, it was 4,361 insects weighing 5.414 grams. The average catch per trap night for all traps was 1,739 insects weighing 3.917 grams. Average catches in check and treated areas did not differ drastically, indicating that the treatments had little effect on the total population of insects. Total catches varied from night to night in the various traps princi-

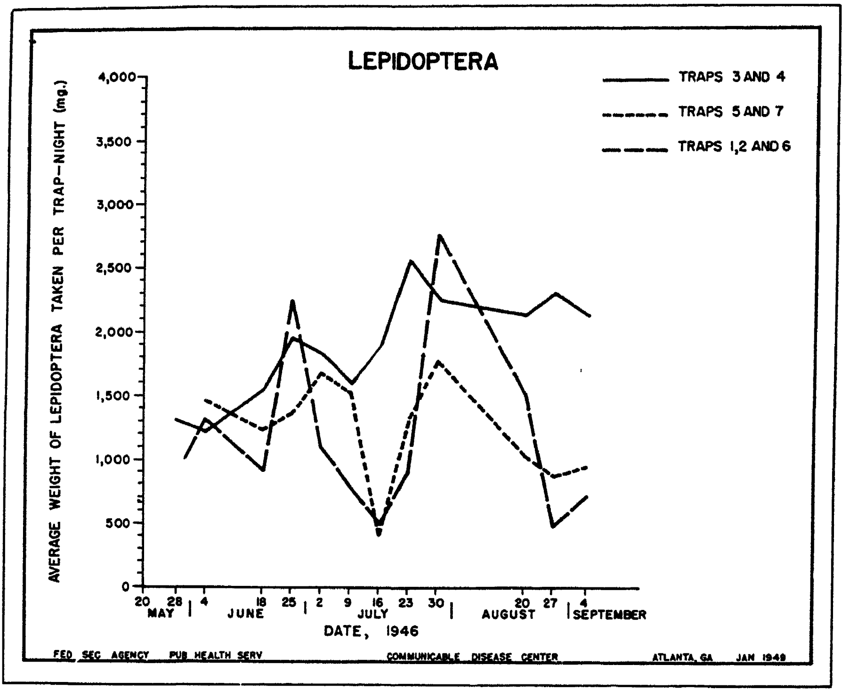

Figure 5. The average weight, in milligrams, of Lepidoptera taken per trap night in wooded island areas sprayed at the rate of 0.1 pound of DDT per acre (traps 3 and 4), in open-dike areas receiving 0.1 pound of DDT as a spray or aerosol (traps 5 and 7), and in check or untreated areas (traps 1, 2, and 6) during the period of study. Each point is the average of four or six trap-night catches.

pally because of differences in weather and the heavy emergence flights of may flies and staphylinid beetles.

The Coleoptera, Lepidoptera, Diptera, and Trichoptera accounted for the majority of insects taken and ranked in numbers in the order named. The composition of the catch also varied as did the average size of the insects taken. Because of the variable and often great numbers of very small insects, principally Staphylinidae, Ephemeroptera, Helodidae, and Chironomidae, taken in the light traps, it was deemed that the dry weight of the total catch and of each of the four dominant orders provided the best basis for a comparison of changes in check and treated areas throughout the period of treatment. The weights of the average catch per trap night for all insects and for the Coleoptera, Lepidoptera, Diptera, and Trichoptera taken in the traps during the period of study are shown in figures 3 through 7.

For purposes of comparison the catches from the seven traps are divided into three groups, namely, catches in the check areas, traps 1, 2, and 6; catches in island areas which were sprayed, traps 3 and 4;

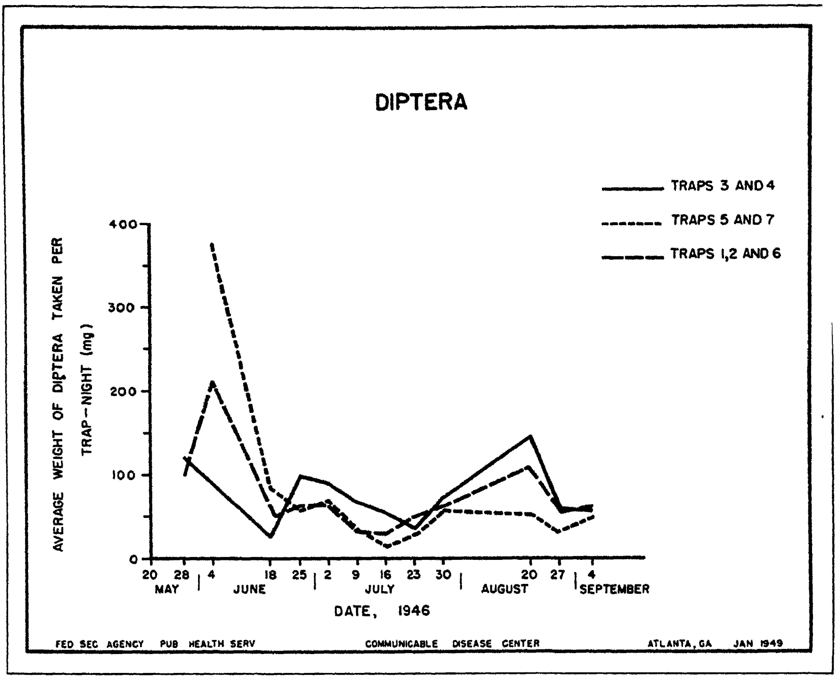

Figure 6. The average weight in milligrams, of Diptera taken per trap-night in wooded island areas sprayed at the rate of 0.1 pound of DDT per acre (traps 3 and 4), in open-dike areas receiving 0.1 pound of DDT as a spray or aerosol (traps 5 and 7), and in check or untreated areas (traps 1, 2, and 6) during the period of study. Each point is the average of four or six trap-night catches.

and catches from open dike areas which were treated, traps 5 and 7. In showing the average catch per trap night for these traps throughout the season, the weights of the catches taken just before and just after each treatment were combined and averaged so that each point on the graph represents the average weight of insects taken during four to six trap nights. A comparison of the weights of all insects taken in the three groups of traps throughout the period of study indicates that the trap catches had a fairly high degree of correlation with each other and that there was no great reduction in the insect population due to the treatments. The four dominant orders with the possible exception of the Trichoptera show no effects that can be definitely attributed to the treatments. The weight of Trichoptera taken in the traps on the islands in the sprayed area was considerably less than that taken in traps of the check areas or the area receiving the thermal aerosol (fig. 7). It is believed that the differences between the curves for the other groups and possibly also for the Trichoptera are due to differences in the ecological situation around the various traps. It

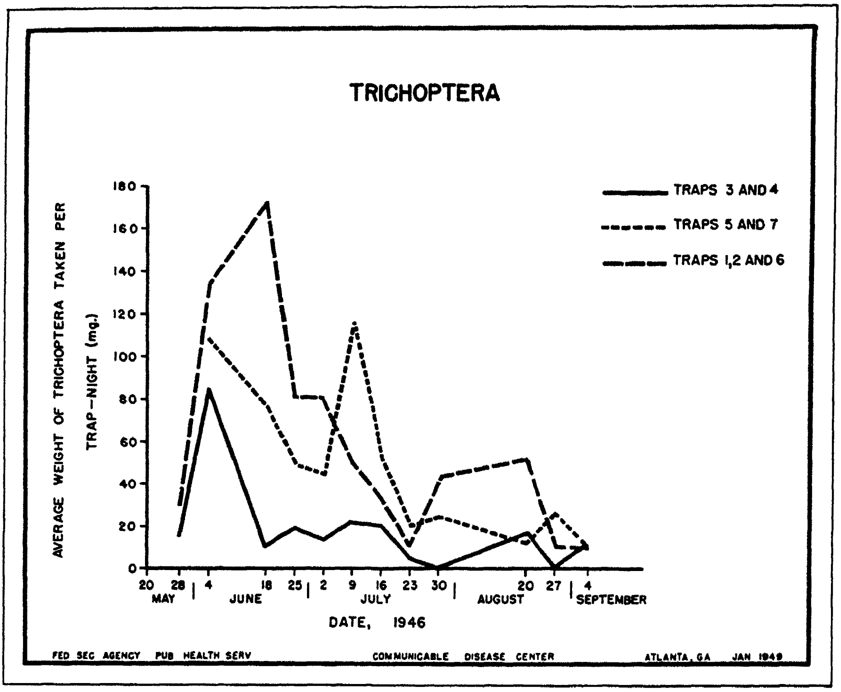

Figure 7. The average weight, in milligrams, of Trichoptera taken per trap-night in wooded island areas sprayed at the rate of 0.1 pound of DDT per acre (traps 3 and 4), in open-dike areas receiving 0.1 pound of DDT as a spray or aerosol (traps 5 and 7), and in check or untreated areas (traps 1, 2, and 6) during the period of study. Each point is the average of four or six trap-night catches.

appears that the major curve variations are due to weather, lunar phases, and emergence of aquatic forms.

Differences in the catches before and after individual treatments were not consistent for the various traps and were not significantly different in check and treated areas.

Collections were made during the latter part of the second year of treatment to determine if 2 years of application had drastically changed the insect fauna. Collections were made in the same locations and at the same times as in 1946; however, because ponds 2 and 3 were not treated in 1947, light traps 5 and 7 for that year were in an untreated instead of a treated area. The average number of insects taken in the various light traps before and after the last three applications in 1946 and 1947 are compared in table 4. It will be noted that variations are considerable. From this limited period of study, the only conclusion which can be drawn is that there was not a catastrophic kill of terrestrial insects in adjoining areas due to routine DDT larviciding over a 2-year period.

Table 4. *A comparison of the average numbers of the various orders of insects taken per trap night in light traps in check and treated areas during the last 3 weeks of treatment in 1946 and 1947—traps 1, 2, and 6 were in check areas and the others in treated areas*

Various orders of insects	Average catch—individual traps											
	Trap 1		Trap 2		Trap 3		Trap 4		Trap 5,[1] 1946	Trap 6		Trap 7,[1] 1946
	1946	1947	1946	1947	1946	1947	1946	1947		1946	1947	
Lepidoptera	192	178	168	206	383	200	331	226	129	136	194	230
Coleoptera	1,623	680	740	271	1,045	310	424	384	1,778	178	363	382
Diptera	73	97	132	413	135	616	146	294	108	52	85	84
Trichoptera	3	3	16	9	7	7	8	8	8	37	6	11
Ephemeroptera	9	3	15	------	7	1	2	------	209	1,230	289	7,209
Homoptera	85	77	21	48	18	32	10	46	256	131	295	67
Hemiptera	25	15	3	6	4	4	3	11	6	9	22	10
Hymenoptera	5	9	8	15	2	31	6	10	3	3	34	1
Neuroptera	------	2	1	1	4	1	2	1	3	1	2	1
Odonata	------	------	1	------	2	2	4	2	6	------	------	1
Orthoptera	------	------	------	------	1	1	1	1	1	------	1	------
Total	2,067	1,063	1,104	970	1,609	1,003	935	982	2,505	4,777	1,290	7,996

Various orders of insects	Average catch—all traps			
	1946		1947	
	Check	Treated	Check	Treated[2]
Lepidoptera	165	357	193	213
Coleoptera	864	735	438	347
Diptera	86	141	198	455
Trichoptera	19	8	6	8
Ephemeroptera	1,418	5	97	----------
Homoptera	79	14	140	39
Hemiptera	12	4	14	8
Hymenoptera	5	4	19	20
Neuroptera	1	3	2	1
Odonata	----------	3	----------	2
Orthoptera	----------	1	----------	1
Total	2,649	1,272	1,108	993

[1] The area surrounding these traps was not treated in 1947.
[2] These averages are for traps 3 and 4 only.

Conclusions

Mosquitoes, deer flies, and sand flies were reduced in numbers by the routine larvicidal treatments; however, for other than these forms, no over-all effect of the treatments was observed. Observations in check and treated areas showed only those differences in general insect numbers and activity which could be considered to be due to differences in the respective ecological situations. Grasshoppers, ants, dragonflies, wasps, bees, and other common forms appeared in usual abundance during the first season of treatment.

Examination of water areas shortly after treatment disclosed considerable numbers of dead insects, especially may flies, damsel flies, certain beetles (*Donacia*), and dolichopodid and acalyptrate flies;

however, during the first season there was no evidence of any general diminution of damsel flies and dragonflies on the wing or of aquatic insects in general.

Aphid colonies in treated and check areas showed no significant differences in vigor or in the occurrence and number of parasites and predators.

Experimental beehives kept under observation during the first season of treatment showed no over-all adverse effects and produced a crop of honey normal for the year. During the two succeeding years of treatment, beekeepers kept many colonies in treated areas with no reported adverse effect, indicating that routine DDT mosquito larviciding is not detrimental to honey production.

Light-trap catches in treated and check areas during two seasons' treatment showed no significant over-all reduction in the insect population of areas adjoining those routinely larvicided with DDT at 0.1 pound per acre with the possible exception of the Trichoptera.

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The authors wish to express their appreciation to their fellow workers who made this project possible. Dr. Arnold B. Erickson assisted in many ways and offered many valuable suggestions. For carrying out the laboratory work in connection with the light-trap studies in 1946, special thanks are due Edward Smart, Harold Kluber, William McLaughin, and Mary McMillen. Mrs. Rosetta Davis Edwards made the calculations for the tables and graphs. For biometrical assistance in matters of plot selection, thanks are due Dr. William M. Upholt. Willis Mathis carried out the light-trap studies in 1947 and tabulated the results. Dr. S. W. Simmons gave valuable advice and suggestions for the conduct of the study and actively supported the project.

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Q Fever—An Epidemiological Note

By Edward A. Beeman, M. D.*

Q fever occurs endemically in Western Europe (*1*), the Mediterranean Area (*2*, *3*), the Balkans (*4*, *5*, *6*, *7*), the Near East (*8*, *9*), Australia (*10*), Panama (*11*, *12*), and in the United States in southern California (*13*, *14*, *15*), Texas (*16*), Chicago (*17*). It has also been recognized in Arizona (*18*), and Montana (*19*). Q fever occurring in the eastern United States has usually been the result of direct association with laboratory sources of infection (*20*, *21*), and one case (*22*) not associated with a laboratory epidemic was probably the result of an infection contracted while the patient was visiting in a Mediterranean endemic area. The present report deals with two cases of Q fever in which the usual epidemiological factors were absent and in which the only contact with the causative organism presumably came through an intermediate source.

Patient A, a housewife aged 39, wife of Patient B, became ill November 14, 1948, and was hospitalized at Walter Reed General Hospital from November 17 to December 15, 1948. She had a severe illness, and the clinical course was consistent with Q fever (*23*, *24*). She developed X-ray evidence of a right pneumonitis which persisted, but with considerable diminution, up to the time of discharge. The diagnosis was established by the appearance of a rising titer of complement-fixing antibodies against the Henzerling strain of *Coxiella burnetii*. Serum collected at the Army Medical Department Research and Graduate School on November 26 showed a titer of 1:160, and another specimen on December 8 showed a positive reaction in a dilution of 1:640 or greater. Serum examined at the National Institutes of Health Microbiological Institute gave a titer of 1:256.

Patient B, an Army officer, 44 years old, husband of Patient A, became ill December 15, 1948, and was hospitalized at Walter Reed General Hospital from December 16, 1948, to January 6, 1949. His illness was rather mild. X-ray evidence of a right pneumonitis was present on admission and showed almost complete resolution at the time of discharge. Serum examined at the Army Medical Department Research and Graduate School showed a rising titer of complement-fixing antibodies against the Henzerling strain of *C. burnetii*: December 17, negative, 1:10; December 27, 1+, 1:10; December 30, positive, 1:40; January 3, 1949, positive, 1:160. Serum examined at the National Institutes of Health showed no titer on December 17 and was positive 1:256 on January 3 against Henzerling antigen.

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* Laboratory of Infectious Diseases, National Institutes of Health. The author is indebted to Dr. Ross L. Gauld of the Army Medical Department Research and Graduate School for access to records on the patients reported.

Epidemiological Data

The patients resided in a suburban Maryland community near Washington, D. C. They lived with A's mother in a brick, single-family, six-room, two-story house. The basement of the house contained a finished room with a bathroom and shower stall. This room was rented for permanent occupancy. It had no direct connection with the main living quarters of the house, and access was gained by two entrances, one through the basement and the other through the outside of the house.

No cattle, sheep, or goats were located in the immediate vicinity and there were no dairies within several miles of this residence. The patients had no contact with animals at any time and had not traveled recently to any endemic areas where *C. burnetii* was prevalent. There was no history of visits to meat packing or rendering plants. The incubation period and onset of their illnesses were beyond the season of peak incidence for ticks in Maryland, and neither reported contact with ticks. Neither patient worked with wool in the raw state. The household used pasteurized milk and obtained meat from one of the Army commissaries.

On August 1, 1948, the basement room of the house was rented to a research worker assigned to the Rickettsial Unit, Laboratory of Infectious Diseases, National Institutes of Health. Patient A had direct and indirect contact with this worker. She did the housework in the room, including a thorough cleaning once a week. She laundered the sheets, pillow cases, and towels used by the occupant in an automatic washing machine but did not do any of his personal linen. The worker frequently paid the family brief visits and occasionally dined with them. On October 31, 1948, about 2 weeks prior to onset of Patient A's illness, the family had a social gathering at which the research worker sat next to the patient. While she was in the hospital, her husband and mother did the cleaning and laundering in the basement apartment. The worker who had been vaccinated against Q fever never showed any evidence of illness during this period, and examination of his serum revealed the absence of antibodies against *C. burnetii.*

About the time of the onset of A's illness, a minor epidemic of Q fever occurred among some of the laboratory and maintenance personnel at the National Institutes of Health. The first case occurred October 10, 1948, the second and third November 11, the fourth November 13, the fifth November 16, the sixth November 18, and the seventh November 22. All these cases (except the case of one patient who denied ever having been in the infectious disease building) had exposure within 2 to 4 weeks of onset of illness inside the Rickettsial Unit. Two patients were maintenance personnel who had been inside the Rickettsial Unit laboratory every day for at least 4 to 5 months. It seems likely then that during the month of October 1948 there was a high concentration of *C. burnetii* in the environment of the laboratory. During that time and for the previous 8 to 9 months antigens were being prepared regularly in large quantities from the Henzerling strain of *C. burnetii* for use in large scale serological tests. One other routine laboratory procedure during this period was the inoculation of large numbers of guinea pigs with milk specimens collected from dairies in southern California; many of these specimens contained *C. burnetii*. The only departure from the routine work prior to the onset of illness in the cases at the National Institutes of Health were several experiments on the thermal death point of some strains of *C. burnetii*. Some of the experiments involved the injection of many guinea pigs with heavily infected yolk sac suspensions of the organism. In connection with this work guinea pigs were infected September 1, September 20, October 1, October 14, and November 10, 1948. Animals infected with this type of inoculum usually have a severe illness and a high mortality. Normal control guinea pigs placed in the cages with these animals showed a high incidence of spontaneous infection (*25*). The exact mode of infection of controls is not known; however, urine specimens from guinea pigs injected with less virulent suspensions have been shown to contain *C. burnetii* (*30*). The new worker in the laboratory (who resided in the home of Patients A and B) at this time was employed primarily in egg inoculation and yolk sac harvesting work. About October 27, 1948, he began participating in the preparation of antigens. He did not begin working with guinea pigs until November 15, 1948.

All workers in the Rickettsial Unit were required to change their laboratory uniforms (coveralls) when working with infected materials; however, protective, discardable outer gowns were not worn and it was not customary to wear protective head coverings. Changing of shoes between infected and clean areas was not customary at that time and frequently many of the laboratory personnel, including the new worker, wore the same shoes both at work and at home.

This gives a general picture of the conditions prevailing within the Rickettsial Unit during the period of probable infection and incubation of the patients discussed in this report.

Discussion

In other studies on the epidemiology of Q fever, certain situations were present in which patients had an opportunity to come into direct contact with the organism possibly by means of infected dust, droplets of infected material, or other particulate matter. The disease occasionally becomes an occupational hazard in certain groups, e. g., laboratory workers (*20, 21, 26, 27*), abattoir and packing house personnel (*10*, *16*, *17*), dairy workers (*15*), rendering plant, and hide workers. Among military personnel, epidemiological evidence (*3*, *28*) points to common sources of exposure for large groups of individuals. Exposure of certain populations (*15*) by reason of proximity to dairies or household use of raw milk seems to be a factor in the incidence of the disease, although the exact role of infected milk in the transmission of the disease is not yet established. Recently Oliphant et al. (*29*) described cases of Q fever occurring in laundry workers who handled unsterilized laboratory apparel used by persons working with the organism. In a sense these cases are comparable to the two described here in that they were indirectly exposed to *C. burnetii*.

None of these factors seem to have been present in the patients of this report. The most feasible explanation for their contact with *C. burnetii* is through the medium of their tenant, but the method by which this was accomplished is not readily apparent. The most reasonable theory is that of passive carriage of the organism from the laboratory either on the clothing, shoes, hands, or hair. It is not surprising that *C. burnetii* would survive the period of transportation from one location to another since it is resistant to physical and chemical agents (*21*, *25*). The onset of illness in Patient A falls within the period when other cases at the National Institutes of Health were occurring. The onset in Patient B came one month later. The latter visited his wife frequently while she was in the hospital. However, previous epidemiological work indicates that person-to-person transmission of Q fever is unlikely. The tenant never showed signs, symptoms, or laboratory proof of Q fever. Patient B assumed many of the household duties of his wife and, therefore, was more intimately exposed to the same environmental conditions of the latter. Although the mother of Patient B had the same contacts, she did not develop clinical or serological evidence of infection.

The set of factors involved in the acquisition of the disease by the patients of this report suggests that laboratory personnel working with *C. burnetii* or any other infectious agent should take scrupulous pains to keep the organism within the confines of the laboratory. Adequate coverings completely protecting all parts of the body not only should be worn but should be completely changed before leaving the laboratory, and all exposed body surfaces should be thoroughly cleansed.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED DECEMBER 31, 1949

For the last week of the year, reported cases of poliomyelitis increased from 154 for the preceding week to 195 and interrupted a consecutive weekly decline for the 18 weeks since August 20. The cumulative total for the year is 42,375 as compared with 27,676 for 1948. The 5-year median (1944–48) is 19,272.

For the week, reported cases of typhoid and paratyphoid fever decreased from the preceding week. One case of anthrax was reported in New York. No cases of smallpox or Rocky Mountain spotted fever were reported. Hawaii reported 528 cases of influenza. Total reported cases of the more important notifiable diseases for the current week, the preceding week, the corresponding week last year, and the cumulative totals for the current and preceding years are shown below.

Disease	*Total for week ended*			*Cumulative total*		*Median*
	12-31-49	*12-24-49*	*1-1-49*	*1949*	*1948*	*1944-48*
Diphtheria	158	118	202	8,039	9,725	14,126
Influenza	2,620	2,289	2,821	106,397	175,085	338,209
Measles	2,778	2,008	7,161	607,648	604,027	602,397
Meningitis, meningococcal	69	57	80	3,429	3,280	5,638
Scarlet fever	1,214	1,083	1,913	74,105	77,924	112,981
Typhoid and paratyphoid fever	25	52	35	3,617	3,592	4.003
Whooping cough	1,470	1,394	619	68,138	72,956	100,212
Encephalitis, infectious	11	12	3	761	564	620

Of 41 States and the District of Columbia reporting on rabies in animals, 24 States and the District of Columbia reported no cases. The remaining 17 States reported 125 cases with the largest numbers in Texas (23), New York (17), and Kentucky (14). The total number of rabies in animals reported for the year is 5,678.

A total of 9,828 deaths was recorded during the week in 91 large cities in the United States as compared with 9,192 last week; 10,384 and 10,238, respectively, for the corresponding weeks of 1948 and 1947; and 10,238 for the 3-year (1946–48) median. For the year to date the total is 466,572 as compared with 466,968 for the same period last year. Infant deaths for the current week totaled 637; for last week, 626; for the corresponding week last year, 644; and for the 3-year median, 712. The cumulative figure is 32,992 as compared with 33,697 for the corresponding period last year.

Telegraphic case reports from State health officers for week ended Dec. 31, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	---	---	---	60	---	27	2	---	9	---	---	---	6	---
New Hampshire	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Vermont	---	---	---	---	---	---	6	---	4	---	---	---	6	---
Massachusetts	6	1	---	29	3	---	4	---	74	---	---	---	117	---
Rhode Island	---	---	1	1	---	---	1	---	9	---	---	---	5	---
Connecticut	---	---	---	4	---	83	3	---	16	---	---	---	66	---
MIDDLE ATLANTIC														
New York	12	2	(2)	196	3	256	17	---	[3] 77	---	---	---	173	17
New Jersey	1	1	3	317	---	96	7	---	438	---	---	1	173	1
Pennsylvania	3	---	---	59	3	70	5	---	59	---	---	1	114	---
EAST NORTH CENTRAL														
Ohio	11	---	7	43	5	84	4	---	186	---	6	---	112	3
Indiana	---	2	20	20	2	19	4	---	49	---	1	---	15	11
Illinois	2	---	2	54	---	75	5	---	43	---	5	---	57	---
Michigan [4]	3	---	3	798	3	43	14	---	98	---	---	---	136	6
Wisconsin	---	---	40	100	---	10	8	---	39	---	---	---	74	2
WEST NORTH CENTRAL														
Minnesota	2	1	---	35	2	9	5	---	17	---	---	---	16	---
Iowa	3	---	---	129	---	---	---	---	13	---	---	---	10	2
Missouri	1	---	1	---	---	19	2	---	12	---	---	---	17	---
North Dakota	---	---	1	35	---	---	---	---	1	---	---	---	3	---
South Dakota	---	---	---	1	---	1	3	---	---	---	---	---	---	---
Nebraska	---	1	22	32	---	6	3	---	23	---	---	---	13	---
Kansas	1	---	---	4	---	16	---	---	18	---	---	---	16	---
SOUTH ATLANTIC														
Delaware	---	---	---	3	1	---	---	---	---	---	---	---	3	---
Maryland [4]	3	---	---	11	1	42	4	---	20	---	---	---	51	---
District of Columbia	1	---	1	52	---	16	---	---	2	---	---	---	---	---
Virginia	4	---	288	13	---	58	1	---	20	---	1	1	23	1
West Virginia	9	---	55	16	5	11	---	---	6	---	---	---	21	9
North Carolina	20	---	---	97	1	---	3	---	75	---	2	1	11	---
South Carolina	3	---	8	53	1	8	1	---	4	---	---	1	1	3
Georgia	9	---	166	7	1	21	5	---	20	---	1	---	6	12
Florida	1	---	2	8	1	15	5	---	4	---	---	1	1	---
EAST SOUTH CENTRAL														
Kentucky	5	---	3	10	6	32	4	---	64	---	---	1	15	14
Tennessee	5	1	43	63	6	49	1	---	16	---	3	---	21	7
Alabama	2	---	39	4	1	37	2	---	11	---	---	---	3	11
Mississippi [4]	7	---	10	49	3	33	1	---	9	---	---	3	6	---
WEST SOUTH CENTRAL														
Arkansas	1	---	143	33	3	67	4	---	1	---	2	1	12	2
Louisiana	5	---	1	---	1	39	2	---	---	---	3	1	6	---
Oklahoma	3	1	121	3	2	40	4	---	14	---	---	1	2	1
Texas	17	1	1,473	46	3	323	14	---	18	---	---	3	55	23
MOUNTAIN														
Montana	---	---	2	22	---	1	---	---	4	---	8	---	---	---
Idaho	---	---	17	2	---	12	4	---	16	---	---	---	---	---
Wyoming	---	---	---	2	---	---	5	---	2	---	---	---	---	---
Colorado	---	---	9	18	3	21	5	---	7	---	---	---	---	---
New Mexico	2	---	---	12	---	13	---	---	3	---	---	---	1	---
Arizona	10	---	123	36	---	14	1	---	7	---	---	3	11	---
Utah [4]	1	---	---	151	---	1	1	---	4	---	---	---	20	---
Nevada	---	---	---	---	---	1	2	---	---	---	---	---	---	---
PACIFIC														
Washington	---	---	1	49	2	---	4	---	47	---	---	---	13	---
Oregon	1	---	13	21	---	15	2	---	8	---	---	---	10	---
California	4	---	2	100	7	21	27	---	47	---	---	6	49	---
Total	158	11	2,620	2,778	69	1,704	195	---	1,214	---	32	25	1,470	---
Median, 1944-48	118	5	3,466	2,723	80	---	86	1	1,913	3	45	43	1,570	---
Year to date, 52 weeks	[5] 8,039	761	106,397	607,648	3,429	77,691	[6] 42,375	560	74,105	48	1,138	3,617	68,138	---
Median, 1944-48	14,126	620	338,209	602,397	5,638	---	19,272	523	112,981	333	1,049	4,003	100,212	---
Seasonal low week ends	(27th) July 9	---	(30th) July 30	(35th) Sept 3	(37th) Sept. 17	---	(11th) Mar. 19	---	(32nd) Aug. 13	(35th) Sept. 3	---	(11th) Mar. 19	(39th) Oct 1	---
Since seasonal low week	[5] 4,271	---	30,530	19,130	913	---	[6] 41,460	---	15,845	7	---	3,157	21,536	---
Median, 1944-45 to 1948-49 [7]	7,566	---	36,270	26,124	972	---	19,009	---	26,686	54	---	3,528	24,337	---

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[1] Including paratyphoid fever currently reported separately as follows. Florida 1, Arizona 2, California 4. Cases reported as salmonella infection not included in the table were as follows: New York 2, Pennsylvania 2.

[2] New York City only.

[3] Including cases reported as streptococcal sore throat.

[4] Period ended earlier than Saturday.

[5] Virginia—Diphtheria, delayed report, 13 cases not assignable to specific weeks.

[6] Deductions—Michigan, weeks ended Aug. 20 and 27, Sept. 17, 1 case each. Arkansas, week ended Aug. 13, 1 case.

[7] The median of the 5 preceding corresponding periods (1944-45 to 1948-49)

Anthrax: New York 1 case.

Alaska: Influenza 1, measles 14.

Hawaii: Influenza 528, whooping cough 1.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Influenza.—During the week ended November 12, 1949, a sharp increase in the incidence of influenza was noted in Hawaii Territory. From November 6 to December 24, 1949, 2,289 cases were reported. Report for week ended December 31, recorded 528 cases.

DEATHS DURING WEEK ENDED DECEMBER 31, 1949

	Week ended Dec. 31, 1949	Corresponding week, 1948
Data for 91 large cities of the United States.		
Total deaths	9,828	10,381
Median for 3 prior years	10,238	
Total deaths, first 52 weeks of year	466,532	466,968
Deaths under 1 year of age	637	644
Median for 3 prior years	712	
Deaths under 1 year of age, first 52 weeks of year	32,992	33,697
Data from industrial insurance companies.		
Policies in force	69,878,197	70,695,788
Number of death claims	9,543	11,777
Death claims per 1,000 policies in force, annual rate	7.1	8.7
Death claims per 1,000 policies, first 52 weeks of year, annual rate	9.1	9.2

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended December 10, 1949.—During the week ended December 10, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	New found-land	Prince Edward Island	Nova Scotia	New Bruns-wick	Que-bec	On-tario	Mani-toba	Sas-katch-ewan	Al-berta	British Colum bia	Total
Chickenpox	1		49	1	187	196	61	52	75	116	738
Diphtheria					13	2					15
Dysentery, bacillary					1						1
Encephalitis, infectious						1					1
German measles			1		15	27		3	72	4	122
Influenza			17				10				27
Measles			16	1	250	109	74	70	87	108	715
Meningitis, meningococcal					1	1				2	4
Mumps			88		193	229	4	13	62	56	645
Poliomyelitis							1			1	2
Scarlet fever	6		4	4	73	69	16	1	65	6	244
Tuberculosis (all forms)	41		4	12	115	24	37	8	4	47	292
Typhoid and paratyphoid fever					9			1		1	11
Undulant fever					1	1	1		2		5
Venereal diseases:											
Gonorrhea	5	1	10	7	87	70	22	15	47	81	345
Syphilis	3		3	5	48	26	5	20	2	10	122
Other forms								1			1
Whooping cough	1				128	60	2		1	15	207

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Burma—Moulmein.—During the week ended December 3, 1949, 1 case of cholera was reported in the town of Moulmein, Burma.

Plague

Indonesia—Java.—For the week ended December 17, 1949, 16 fatal cases of plague were reported in Jogjakarta City, Java.

Union of South Africa—Southwest Africa.—During the week ended December 3, 1949, 3 suspected cases of plague, with 2 deaths, were reported in Gobabis District, Southwest Africa.

Smallpox

Pakistan—Chittagong.—During the week ended December 17, 1949, 12 cases of smallpox with 2 deaths were reported in Chittagong, Pakistan.

Information from Dacca, Pakistan, dated December 23, 1949, states that 11 fatal cases of smallpox occurred among passengers on a pilgrim ship due to arrive at Chittagong from Jedda on December 16, and that 70 additional cases were reported aboard the ship.

Palestine.—During the month of November 1949, 101 cases of smallpox were reported in Palestine, including 58 cases in Hebron and 5 cases in Jerusalem.

Peru—Pacasmayo.—Information dated January 3, 1950, states that in the recent outbreak of smallpox in the port of Pacasmayo, Peru, 90 cases with 20 deaths were reported during the period beginning in the month of September, ending December 6, 1949.

PLAGUE INOCULATION FOR JORDAN AIR TRAVELERS

Quarantine restrictions for plague have been imposed on air travelers arriving in Jordan from the Cape of Good Hope Province, South Africa. The restrictions, put into effect Dec. 14, 1949, by the Public Health Department at Amman, Hasemite Kingdom of the Jordan, require air travelers to have an international inoculation certificate.

Regular Corps Examinations

Examinations for psychologists, bacteriologists, and nurses will be held March 20, 21, and 22 for appointments in the Regular Commissioned Corps of the Public Health Service. Completed applications must be in the Washington Office by February 20.

Psychologist and bacteriologist appointments will be made in the grades of assistant and senior assistant, equivalent to Army ranks of first lieutenant and captain, respectively. The nurse appointments will also include the junior assistant grade (second lieutenant).

Psychologist applicants must have at least 7 years training and experience after high school, including a doctor's degree in psychology from a university of recognized standing. Bacteriologist applicants must have at least 7 years of training and experience after high school, including a doctor's degree in bacteriology. Nurse applicants must be graduates of an approved school of nursing, have a bachelor's degree from a recognized college, and be currently registered as a graduate professional nurse. Additional nurses' training and experience are required for assistant and senior assistant grades.

For application forms and additional information write to: Surgeon General, Public Health Service, Federal Security Agency, Washington 25, D. C. Attention: Division of Commissioned Officers.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

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Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

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FEDERAL SECURITY AGENCY
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PUBLIC HEALTH SERVICE
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Division of Public Health Methods
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Statistics on Clinical Services To New Patients in Medical Groups

By ANTONIO CIOCCO, Sc. D., G. HALSEY HUNT, M. D., and ISIDORE ALTMAN, M. S.*

One of the major components of the survey of medical group practice made by the Public Health Service (*1*) was the collection of data on the kinds and amounts of medical service furnished by the groups.[1] Such data are of basic value in providing a comprehensive description of the operations and functions of medical groups. A first analysis of the data on services provided is presented here with reference to a total of 3,200 new patients, i. e., patients seen for the first time, in 16 medical groups. This study reports the findings on the age, sex, and residence characteristics of the patients, their complaints, the diagnoses recorded, and the diagnostic procedures and treatments received. The findings are also examined in relation to the hospital training and specialist status of the physicians of the groups.

As a rule, students of the clinical aspects of group practice, and of medical practice generally, have confined their published data on medical services to rather broad descriptions of scope and volume, with impressions as to the quality of the care given. Interviews with physicians, clinic personnel, and patients, questionnaires, subjective observations by visiting professional experts, and data indicating the general scope, volume, and costs of services have been the primary types of information analyzed. Quantitative measurements—of the types and volume of services, for example—have been made in such broad categories as total number of visits and of laboratory, X-ray, or related services. These yardsticks call for considerable refinement. Comparison of the services of physicians or of groups on the basis of measurements of general volume of services is relatively meaningless unless the characteristics of the patients as well as of the physicians and the staff are known and taken into consideration.

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*From the Graduate School of Public Health, University of Pittsburgh; Division of Hospitals, Public Health Service; and Division of Public Health Methods, Public Health Service, respectively. The authors gratefully acknowledge the helpful assistance given in various phases of the study by Dr. Leslie A. Falk, Miss Olive G. Johnson, Mrs. Myrtle C. Sydenstricker, Mozart I. Spector, and Henry W. Crowder.

[1] This is the seventh in a series of studies on medical group practice from the Division of Public Health Methods (*1–6*).

In this study of medical groups an attempt has been made to utilize patients' case records as a source of data for the development of specific indices of actual clinical relationships, such as those between the patient's complaint and the diagnostic and therapeutic measures received. Although the limitations of case records are acknowledged, the findings to be reported in this and later papers will point to the actual and potential value of such records in providing information for the quantitative study of medical services.

Method of Study

The Public Health Service studied 22 medical groups intensively in 1946 and 1947. All groups surveyed met the requirements adopted for the purposes of the project: they comprised three or more full-time physicians, were organized on a formal basis, and provided services in more than one specialty. The survey included groups from every region of the United States and from a range of community sizes. The individual groups varied in size of staff, type of ownership, and method of receiving payment from patients. Each had an established record system which gave promise of yielding much of the information desired. Detailed data on administrative characteristics of these groups have been presented in earlier reports (*2–6*).

Data on the services provided by the groups were obtained from three different samples of patients: (1) patients who visited the clinic during 1 week, (2) obstetrical cases, (3) new patients. It is the last sample to which this report is limited. In 16 medical groups,[2] the records of 200 patients who came to the clinic for the first time just prior to the period of the survey were abstracted and data were obtained on the services received for a period of 14 days following admission. No attempt was made to apportion this sample among the physicians. It consisted of 200 consecutive records except for the following: obstetrical patients, because they were studied separately; a small number of patients who were first visited by a physician of the group in a hospital; and patients with two or more diagnoses falling into different diagnostic categories. With respect to the last point, it was decided that if cases were limited to a single diagnostic category a clearer picture of the relation between diagnosis and treatment would result, and the services received by new patients could be better evaluated. A special count of patients in six medical groups for whom data are excluded because their diagnoses fell in more than one diagnostic category showed that on the average there were 23 such persons who were omitted in the selection of the sample.

The data abstracted from each record were the age, sex, race, and address of the patient; the source of referral to the group and the patient's purpose in asking for medical attention; and the following annotations recorded for the 14 days following the first visit: number of visits, home and office; number of physicians seen; complaints; physical examination, laboratory, X-ray, or other diagnostic services received; two principal recorded diagnoses in the same diagnostic category; and the therapeutic measures prescribed or provided.

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[2] Five medical groups had been visited before the new-patient study was undertaken. This study was also not feasible in one subsequent group, thus leaving 16 groups out of the total of 22 surveyed.

From these data, this report describes in statistical terms the amounts and kinds of services received during the first 2 weeks of contact between the patient and the medical group.

Characteristics of New Patients

Sex and Age. The sample of 3,200 patients consisted of 52 percent males and 48 percent females. The excess of males is contrary to the usual finding that more women than men seek medical services, but it can be explained to some extent by the source of referral. In three medical groups where the percentage of males ranged from 58 to 65, more than 10 percent of the new patients were referred through the Veterans Administration "home town" plan for medical care; in four others where the percentage of males ranged from 48 to 57, the source of referral for the patient's first visit to the group in 9 percent or more of the cases was the patient's place of employment. In the nine remaining groups only 48 percent of new patients were males.

The average age of all new patients was 29.0 years. The distribution by age-class is shown in table 1, which also gives comparable figures for the United States population. The percentage of persons in the age classes 5–14 years and 45 years and over is smaller in this sample of new patients than in the general population. The differences may be due to peculiarities of the sample or may be a distinguishing characteristic of new patients. Some of these differences reflect the source of referral of the patients. That fewer children aged 5–14 request medical services is to be expected since the incidence of disease in this age class is low. One explanation of the relatively few persons in the ages 45 and over among new patients may be that

Table 1. *Percentage distribution of new patients by age: Comparison with population of United States*

Age (years)	Group practice study: new patients	United States population[1]
Under 5	14.1	9.9
5–14	9.8	15.5
15–24	19.7	15.6
25–44	34.6	30.1
45–64	16.6	21.2
65 and over	5.2	7.8
All ages	100.0	100.0

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[1] Source: Department of Commerce, Bureau of the Census. Current Population Reports. Population Characteristics. Series P-20, No. 9, Jan. 19, 1948. Data are for April 1947, white population.

people have usually chosen a physician before reaching that age period.

The age composition of these new patients varied considerably among the medical groups. The average age ranged from 23.1 to 35.7 years; the proportion of patients under age 5 ranged from 5 to 28 percent; the proportion of patients aged 45–64 ranged from 9 to 24.5 percent.

The number of patients whose age was not recorded was rather high, 609 cases out of 3,200. The records where ages were not indicated were mainly concentrated in a few medical groups and sometimes were attributable to a few physicians within the group.

Race. Less than 3 percent of this sample was nonwhite. In 13 of the medical groups, the proportion of Negro patients was less than 1 percent. The total number of nonwhites in the sample was too small to permit separate analysis.

Distance of Patient's Residence From Medical Group. The residence of the new patient was classified as: (a) in the community in which the medical group was located; (b) within a band of 10 miles outside the community limits; or (c) more than 10 miles beyond the community limits. The percentage distribution of patients by this classification appears in table 2.

The data for the groups have been combined by size of city, since distance has a different significance for communities of different size. In the cities of 100,000 or more, the number of patients from outside the city limits was small with the exception of one group which attracts patients from its entire region. As size of city decreases and rurality increases, the percentage of patients coming from outside the city rises. This increase in percentage would be more marked were it not for one medical group which is located in a town of only 7,000 population and draws almost two-thirds of its patients from its own community.

An item relevant to distance from the medical group is the fact that all but two of these groups were "service" groups; that is, their prin-

Table 2. *Percentage distribution of new patients by distance from medical group: Groups combined by size of city*

Size of city	Number of groups	All new patients	Distance from medical group			
			In group community	Within 10 miles of community limits	10 miles or more beyond community limits	Unknown
1,000,000 or more	1	100.0	89.5	0	9.0	1.5
100,000–1,000,000	3	100.0	67.4	3.3	25.8	3.5
25,000–100,000	4	100.0	64.2	1.2	33.4	1.2
10,000–25,000	4	100.0	48.2	4.0	40.4	7.4
2,500–10,000	4	100.0	38.0	2.0	55.6	4.4
All groups	16	100.0	55.8	2.4	37.8	4.0

cipal activity consisted of furnishing more or less complete medical care to a continuing clientele. "Reference" clinics, which furnish specialized care to patients referred to them by outside physicians (*1*), probably have a greater proportion of patients who come from a distance.

Purpose of Visit, Complaint, and Diagnosis

The percentage of new patients who had a recorded complaint as the cause of their first visit ranged from 59 to 95 with an average of 84. Where these percentages were relatively low, industrial examinations—and in one instance, children's examinations—accounted largely for the remainder of the patients.

The complaints recorded were of great variety, involving every region of the body, although a few occurred with relatively high frequency. The ten most frequent complaints among the new patients are listed below as percentages of the total number (one per patient).

Complaint	*Percent of total*
Abdominal pain	8.5
Pain from recent injury	6.8
Rash	5.6
Cough	5.4
Ache or pain (not classified elsewhere)	5.3
Backache	4.6
Headache	3.8
Nerves, nervousness	3.6
Sore on skin	3.0
Growth or lump on body	3.0

Other complaints of somewhat lesser frequency were fatigue or tiredness, pain in chest, and sore throat. There was considerable variation among the medical groups in the percentages of new patients with the several complaints, but on the whole those listed above represented the most frequent ones in the majority of groups.

The separate diagnoses recorded for these patients numbered more than 100. They have been grouped into broad categories in table 3, with the most frequent specific diagnosis or diagnoses in each category shown in parentheses.

The relative frequency of occurrence of the disease categories is readily seen from the table. Disorders of the skin had the highest incidence; trauma or accidental injuries were second; digestive disorders third, and so on. Among the male patients the leading diagnosis was trauma; among females, skin disorders were first and disorders of the genital system second. Variations among age groups should also be noted. Some indications of such variations are brought out in the order of frequency of the five leading diagnosis categories listed for each age class.

Under 5	*5-14*	*15-24*	*25-44*	*45-64*	*65 and over*
Digestive	Upper respiratory	Trauma	Female genital	Cardiovascular	Cardiovascular
Upper respiratory	Trauma	Skin	Central nervous	Musculoskeletal	Eye
Skin	Skin	Central nervous	Skin	Digestive	Skin
Trauma	Eye	Digestive	Musculoskeletal	Skin	Musculoskeletal
Musculoskeletal	Digestive	Upper respiratory	Trauma	Metabolism	Digestive

The medical groups varied also in the frequency of the several diagnoses. This variation was particularly marked relative to upper respiratory diseases and disorders of the eye.

Table 3. *Percentage distribution of new patients by diagnostic category*

Diagnostic category [1]	Both sexes	Male	Female
Skin (infection or inflammation, etiology not specified)	10.2	9.8	10.6
Trauma (laceration, puncture wound)	9.6	12.7	6.3
Digestive (gastritis, gastro-intestinal upset, enteritis, diarrhea, colitis)	7.5	9.0	5.9
Musculoskeletal and peripheroneural (ganglion, flat feet, "other")	6.5	7.6	5.4
Upper respiratory (tonsillitis, hypertrophy of tonsils)	6.4	7.0	5.7
Central nervous and mental (neurosis, psychoneurosis or neurotic manifestation)	4.9	6.1	3.6
Eye (refractive error, glasses prescribed)	4.5	4.4	4.6
Female genital (diseases of female genital organs, fibroid uterus)	3.7	----	7.7
Cardiovascular (diseases of veins)	3.7	3.4	4.2
Metabolic (diseases of thyroid and parathyroid glands, excluding hyperthyroidism)	2.2	.6	3.8
Other respiratory (bronchitis)	1.9	2.1	1.7
Ear (middle or internal otitis)	1.5	1.7	1.2
Body as a whole (obesity, underweight)	1.5	1.2	1.8
Male genital (diseases of male genital organs excluding hypertrophy of prostate)	1.1	2.1	----------
Other disease (nonmalignant neoplasm)	1.0	.8	1.3
Urinary (hydronephrosis, kidney stone, "other" diseases of kidney)	.9	.6	1.3
Venereal	.7	.8	.6
Malignant neoplasm	.7	.5	.8
Tuberculosis (pulmonary)	.2	.3	.1
No disease	7.5	7.3	7.7
Examination, test, or treatment	3.4	2.9	3.8
Diagnosis not recorded	20.4	19.1	21.9
All diagnoses	100.0	100.0	100.0

[1] Items in parentheses are the most frequent specific diagnoses according to the code devised for this study.

The frequency of unrecorded diagnoses is to be noted. Diagnoses were not recorded for about 20 percent of the patients within the period of study. The number of these omissions also varied among the groups, the frequency ranging from 10 to 33 percent. As has been pointed out, the omission of items from the medical record with any regularity was limited to a few medical groups, and these omissions were usually found in the same groups. Ranking the medical groups according to the frequency with which various items were omitted reveals that the rank correlation between omission of data about examination and omission of data about complaint was .40; between omission of diagnosis and omission of treatment it was .41.

Recorded Services Received by New Patients

Number of Visits. The records indicate that the 3,200 patients made 4,859 visits during the 2-week period of their first contact with one of the medical groups. The average number of visits per patient was thus 1.5. The range among the medical group was 1.2 to 2.0. Thirty percent of the new patients made more than one visit, with the range 13 to 48 among the groups.

Home calls played an insignificant role in the sum of visits, totalling 19 for all the medical groups combined. Though it is possible that many home calls may not have been recorded, it is clear from other evidence obtained that these groups provide relatively few such calls.

Personnel Seen. Less than 1 percent of the new patients failed to see a physician at some time in the 2-week period. In terms of visits, all but 283 in a total of 4,859 were visits in which the patient saw a physician. Of these 283 visits, 65 occurred in one medical group.

The records showed that 256 patients (8 percent of the total) had seen more than one physician, and 141 patients (4 percent) were recorded as seeing two or more physicians on the same day. Because of probable omissions in recording, these figures may understate the actual extent of referrals, especially since consultations among physicians of a group are often on an informal basis.

Examination of the Patients. For the purposes of this study, examinations of the patient were classified as either general or local. An examination was defined as local if it was limited to the region or organ about which the patient complained, or if it did not include the heart, lungs, abdomen, and at least two other regions or organs. If a local examination was received on one visit and a general examination on another, the latter, i. e., the more extensive of the two, was the examination tabulated.

Of the 3,200 new patients, 40 percent received general and 46 percent local examinations; 14 percent had no examination recorded. The groups ranged from 59.5 to 96 in the percentages of their new patients who received a general or local examination. It is not determinable how many of the new patients actually received an examination among those with none recorded. But many such patients must have had some kind of examination, because otherwise the diagnoses recorded in their cases could hardly have been made. For example, among the 434 patients who apparently received no examination were 40 with respiratory ailments, 23 with digestive disturbances, and 22 with musculoskeletal and peripheroneural ailments.

Among males and females aged 45 and over, 42 percent received a rectal examination. From group to group, the percentage ranged from 13 to 82. As far as the records showed, all these examinations were digital; none was anoscopic or proctoscopic. Among females aged 45 and over, 40 percent received a vaginal examination. Variation among the clinics was from 0 to 89.5 percent. The clinics highest in percentage of rectal examinations tended to be highest also in the percentage of women receiving vaginal examinations. Again, a certain amount of understatement may be involved in these percentages because of the failure to record all examinations.

Laboratory and X-ray Services. There were few groups in which the vast majority of new patients did not receive at least some laboratory or X-ray service. Urinalysis was the most frequent procedure performed. For all the groups combined, the percentage of patients receiving urinalysis was 30.5; in one group it was only 4.5, and the highest percentage was 54.5.

The blood determinations were divided into two types: (a) complete blood count, which had to include at least white and red blood cell enumeration, differential counts, and a hemoglobin determination, and (b) partial blood counts, consisting of one or more of these procedures, but not all four. Of all the blood determinations recorded, almost two-thirds were, by this definition, complete blood counts. The percentage of new patients receiving a complete or partial blood determination ranged among the groups from 10 to 53.5, with the average at 29.5.

X-ray and fluoroscopy services were given to 21 percent of the new patients. The highest percentage for any group was 38.5. Wide variation among the groups is demonstrated by the fact that for the respiratory diseases, where some uniformity in X-ray might have been expected, the percentage of patients X-rayed ranged from 0 to 43 percent. For the 16 medical groups combined, the most frequent type was X-ray of the chest (35 percent of the total X-rayed); gastrointestinal series was second (20 percent), and X-ray of the spine third (11 percent). The incidence of basal metabolic tests and of electrocardiograms was for the most part very low, as would be expected.

Treatment

For purposes of analysis, the many different treatments have been combined into 17 categories (table 4). These 17 categories can be roughly divided into drug therapy and other therapy. In addition to the patients who received some kind of treatment, a considerable number, 18 percent of the total, required no treatment; about three-fourths of these patients had come to the group for examination, laboratory test, X-ray, etc.

Drug therapy numerically exceeded other therapy. In the former class, sedatives or stimulants were given to 13 percent of the new patients, topical applications to 10 percent, and vitamins and the like to 9 percent. Minor surgery was performed for 12 percent of the patients. Here an understandable sex difference is to be observed; 15 percent of the male patients received minor surgery as compared to 9 percent of the females.

The groups differed considerably in the proportion of patients for

Table 4. *Percentage of new patients receiving specified categories of treatment*

Treatment category[1]	Both sexes	Males	Females
Drug therapy:			
Topical applications (ointments, antiseptics)	10.2	9.9	10.4
Sedatives or stimulants (barbiturates, codeine)	12.9	11.2	14.8
Respiratory remedies (cough mixtures, inhalants, nose drops)	4.8	4.9	4.7
Cardiovascular remedies (digitalis, quinidine)	.5	.2	.7
Digestive remedies (laxatives, antidiarrheics, antacids)	3.3	3.3	3.3
Urinary remedies (diuretics, antiseptics)	.3	.2	.3
Chemotherapeutics (sulfonamides, penicillin)	5.4	4.9	6.0
Spirocheticidal and similar drugs	1.2	1.2	1.2
Antipyretics and analgesics	3.0	3.6	2.3
Hormones	3.8	.9	6.9
Vitamins, minerals, and hematinics	9.2	7.1	11.4
Immunizations and other biologicals	2.8	2.7	2.9
Other therapy:			
Diet	7.3	7.4	7.4
Home treatment (bed rest, exercises)	8.3	7.1	9.6
Physical, X-ray, and radiotherapy	5.8	5.9	5.8
Minor surgery	12.4	14.8	9.4
Miscellaneous (including some drugs)	6.4	5.7	7.4
No treatment necessary	18.0	17.3	18.9
No treatment recorded	17.5	22.3	12.5

[1] Items in parentheses are illustrative and do not include all the treatments in the category.

whom the various kinds of treatment were prescribed. For example, the percentage of patients treated with sedatives or stimulants or for whom these drugs were recommended ranged from 6 to 33 percent.

Again, attention is called to the frequency with which treatments presumably went unrecorded. The percentage for all groups combined was 17.5 with a range from 7.5 to 35. The highest percentages occurred among the same medical groups in which other kinds of information were not recorded.

Diagnoses, Services, and Treatment

The reason for a patient's visit, whether it is an ailment or the desire for immunization or other preventive measure, will of course be reflected in the services provided by the group and the treatment prescribed. In table 5, the diagnostic categories employed in this study have been ranked according to the frequency of general examination received by the new patients the first 2 weeks. At the top are the diseases of metabolism, of the cardiovascular, digestive, and female genital systems, and tuberculosis. More than 60 percent of the patients with these diagnoses received a general examination as defined here. At the other end are such diseases as those of the skin, eye and ear, and injuries, for which less than 20 percent of the patients received a general examination.

The frequency of urinalysis and blood count as well as of roentgenologic examination follows the same pattern, with certain differences which are to be expected. In the case of injuries, for example, the great majority of patients had examinations limited to the part of the body involved, and only a few received urinalysis or a blood count, but almost one-third had X-ray examinations.

Table 5. *Percentage of new patients in each diagnostic category receiving specified services*

Diagnostic category	Number of patients	Examination			Laboratory test				X-ray
						Blood count			
		General	Local	None	Urinalysis	Complete	Partial	Other blood test	
Tuberculosis	6	83.3	--------	16.7	50.0	50.0	16.7	33.3	66.7
Metabolic	69	82.6	13.0	4.4	63.8	39.1	26.1	14.5	13.0
No disease	238	70.6	22.3	7.1	34.9	13.9	14.7	1.7	18.1
Female genital	119	68.9	26.9	4.2	63.9	35.3	24.4	4.2	15.1
Cardiovascular	119	66.4	28.6	5 0	60.5	30.3	24.4	11.8	32.8
Body as a whole	47	66.0	14.9	19.1	55.3	48.9	10.6	2.1	21.3
Other respiratory	61	65.6	14.7	19.7	44.3	27.9	16.4	--------	37.7
Digestive	240	65.0	24.6	10.4	43.3	27.1	21.3	12.9	29.6
Central nervous and mental	157	58.0	34.4	7.6	40.8	23.6	14.6	7.0	24.8
Other	33	57.6	39.4	3.0	45.5	51.5	6.1	3.0	15.2
Urinary	30	53.3	33.3	13.4	80.0	26.7	16.7	13.3	40.0
Musculoskeletal and peripheroneural	208	46.6	43.3	10.1	41.3	26.0	13.5	3.4	44.7
Male genital	35	45.7	51.4	2.9	57.1	22.9	14.3	8.6	14.3
Malignancy	22	45.5	50.0	4.5	31.8	22.7	18.2	4.5	31.8
Upper respiratory	205	40.5	45.8	13.7	20.0	15.1	6.3	--------	11.2
Diagnosis not determinable	662	37.6	37.3	25.1	33.4	22.2	8.6	3.5	18.6
Venereal	22	27.3	50.0	22.7	45.4	18.2	13.6	--------	4.5
Ear	48	16.7	72.9	10.4	12.5	2.1	6.2	2.1	8.3
Skin	324	13.0	84.5	2.5	13.6	7.4	5.6	1.2	1.9
Examination, test, or treatment	107	10.3	13.1	76.6	6.5	4.7	1.9	--------	27.1
Trauma	306	6.2	86.6	7.2	4.6	2.3	1.3	.7	32.7
Eye	142	2.1	97.9	--------	4.2	2.8	.7	--------	1.4
Total	3,200	40.2	46.2	13.6	31.2	18.7	10.8	3.9	20.8

For each of the diagnostic categories there were noticeable differences among the medical groups. In the case of diseases of the digestive tract, the percentage frequency of general examination varied from 12.5 to 88.5, urinalysis from 14 to 71, complete blood count from 0 to 67. Similar orders of difference are observable for all the disease categories.

Of some importance is the relationship between the number of visits made in the 2-week period and the disease or ailment for which they presumably were made. The number of visits per patient in each disease category is shown below ranked in order of magnitude.

Disease category	*Visits per patient*	*Disease category*	*Visits per patient*
Malignant neoplasm	2.5	Skin	1.6
Urinary	2.2	Other respiratory	1.6
Venereal	2.0	Central nervous and mental	1.6
Male genital	1.9	Body as a whole	1.6
Metabolic	1.9	Musculoskeletal	1.6
Tuberculosis	1.8	Female genital	1.5
Cardiovascular	1.7	Ear	1.4
Digestive	1.7	Upper respiratory	1.4
Trauma	1.7	Eye	1.2

The number of visits by and large is associated with the degree of seriousness of the disease.

Many different forms of treatment were prescribed for the patients in these disease categories. A summarization has been made for six of

Table 6. *Percentage of new patients receiving specified treatments for six diagnostic categories*

Treatment category[1]	Diagnostic category					
	Skin	Trauma	Digestive	Musculoskeletal and peripheroneural	Upper respiratory	Cardiovascular
Drug therapy:						
Topical applications (ointments)	50.3	16.7	2.5	3.4	----------	2.5
Sedatives or stimulants	10.8	2.6	25.4	7.7	16.1	26.9
Respiratory remedies (cough mixtures)	1.2	1.6	2.1	----------	31.2	.8
Cardiovascular remedies (digitalis)	----------	----------	----------	----------	----------	10.9
Digestive remedies (laxatives, antacids)	.6	----------	19.6	1.0	----------	2.5
Urinary remedies (diuretics)	----------	----------	----------	----------	----------	----------
Chemotherapeutics	5.9	1.6	5.0	----------	18.5	2.5
Spirocheticidal and similar drugs	----------	----------	2.5	.5	1.5	1.7
Antipyretics and analgesics	1.5	2.0	1.2	15.9	4.4	.8
Hormones	1.9	----------	----------	3.4	----------	5.9
Vitamins, minerals	6.2	1.3	6.7	16.3	10.2	11.8
Immunizations	1.5	7.5	----------	.5	2.9	----------
Other therapy:						
Diet	4.9	.3	27.9	4.3	1.0	13.4
Home treatment (rest)	13.3	10.8	3.3	18.3	4.4	10.1
Physical, X-ray, radiotherapy	8.0	12.1	2.9	21.2	1.0	5.9
Minor surgery	26.9	53.9	1.7	2.4	4.9	8.4
Miscellaneous (including some drugs)	1.2	.3	----------	2.4	1.0	----------

[1] Items in parentheses are illustrative of the treatment category.

the more frequent categories: digestive, cardiovascular, upper respiratory, skin, trauma, and diseases of the musculoskeletal and peripheroneural system (table 6).

In the case of digestive diseases the most frequent forms of treatment related to diet, followed closely by sedatives or stimulants and such drugs as cathartics, antacids, etc. In cardiovascular diseases, sedatives or stimulants were the most frequent recommendation, followed by recommendations regarding diet and vitamins. About 30 percent of the patients with upper respiratory diseases received such remedies as nose drops and cough mixtures. To a smaller percentage the recommendation was for the sulfonamides and sedatives or stimulants. Almost half of the patients with skin disorders received ointments and the like for topical application, and about one-fourth had minor surgery. These figures were reversed in the case of patients who came in for treatment of injuries. The patients with musculoskeletal and peripheroneural disorders received, in order of frequency of prescription, physiotherapy (21 percent) and home treatment (18 percent).

For each form of treatment there was tremendous variation from group to group, ranging in some instances from 0 to almost 100 percent. For example, sulfonamides were not prescribed to any patient with upper respiratory diseases in four medical groups, but they were prescribed for 71 percent of such patients in one group and for 57 percent in another.

Variations in Services With Physicians' Training and Experience

The variation among the medical groups in volume and kinds of services may be due to many factors. Some of it may result from differences in the characteristics of the patients and their medical needs, and some from differences among the physicians in their methods of practice. Since data were available on the length of hospital training and specialist status of the physicians of the groups, the relationship between the variation among groups in terms of the services received by the patients and the attributes of the groups as determined by these characteristics of the physicians was examined.

The groups were ranked according to (1) average number of months of hospital training of their physicians, and (2) percentage of their physicians who were certified specialists. For each of these two characteristics, the medical groups were classified into three sets—the "high" set which includes the first five groups in rank order; the "middle" set which includes the next six groups in order; and the "low" set which contains the last five groups. It will be recalled that records were obtained on 200 new patients of each medical group; the findings regarding the high and low sets therefore relate to 1,000 patients each, while the findings regarding the middle set are based on 1,200 patients.

The average amount of hospital training of the physicians of the five groups composing the set that was high according to this characteristic was 42 months. For the six groups composing the middle set, the average was 32 months; and for the five composing the low set, it was 26 months. The percentage of certified specialists in the high, middle, and low sets, when the medical groups were classified according to this characteristic, was 59, 29, and 3, respectively. Since the ranking of the groups varied for each characteristic, a given medical group was not necessarily in the high, middle, or low set for both classifications.

Little difference was found in age composition of patients among the three sets of medical groups, whether the groups were classified according to months of hospital training or number of certified specialists. There were more male than female patients seen by the groups with the larger proportion of specialists. However, when the data were adjusted for these differences, only negligible changes resulted.

Selected items on volume and kinds of service received in the high, middle, and low sets of the medical groups are shown in the chart. The figure is limited to the findings which reveal for either of the two characteristics a consistent change, increase or decrease, from the high to the low set of medical groups and a statistically significant difference[3] between the high and low sets.

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[3] At the 5 percent level of probability.

As one might gather from the chart, significant differences appear between high and low sets in hospital training with respect to the following items: There were more general examinations among patients of the groups in the high set, 46 percent against 36; and as a corollary, there were fewer patients for whom no examination was recorded, 10 percent against 16.5. Far more persons over age 45 received a rectal examination from physicians in the high set, 54 percent against 31. The high set also provided considerably more X-ray services, 24 percent against 15.

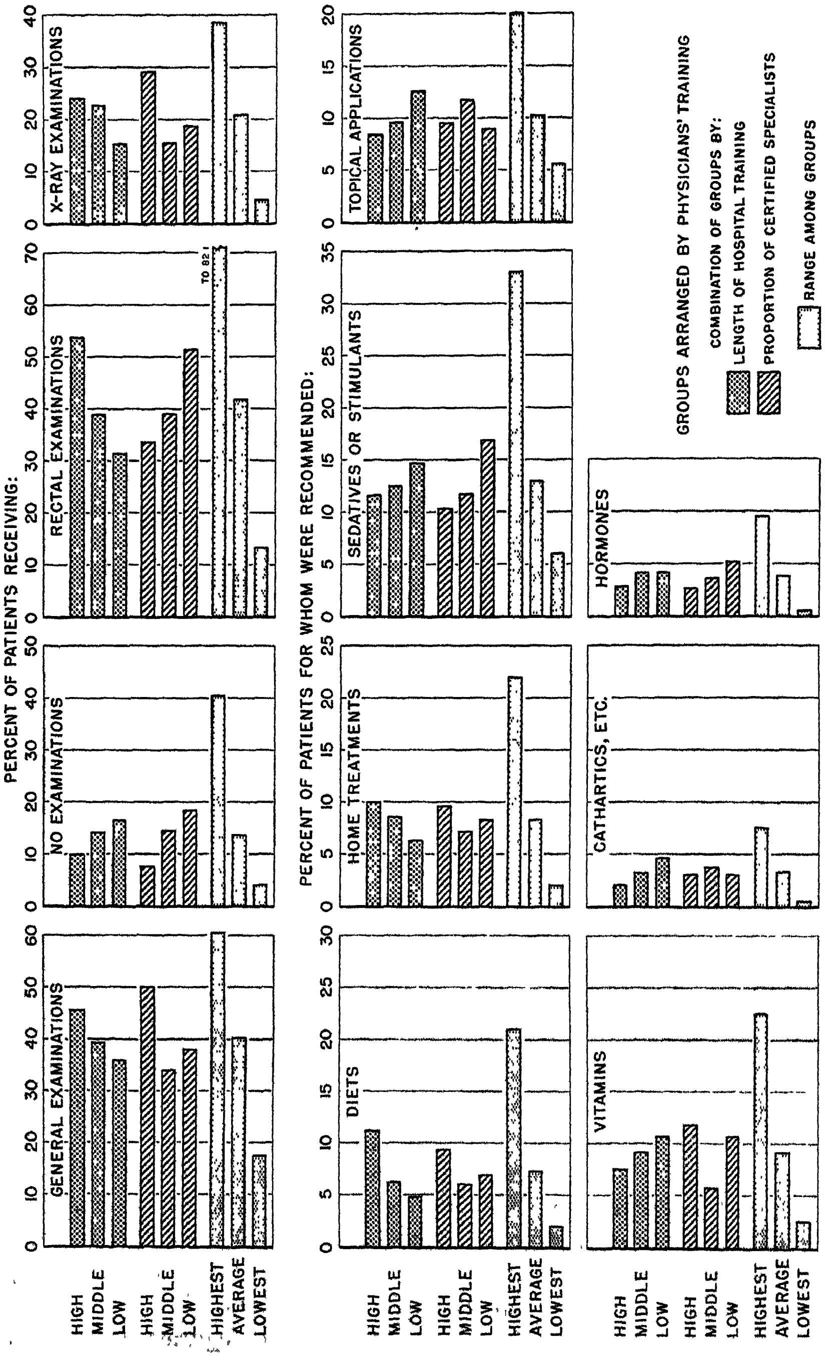
Significant differences between the high and low sets were found in several of the treatment categories. The set with least hospital training provided a greater percentage of patients with the following types of medicaments: sedatives or stimulants, topical applications, vitamins, hormones, cathartics, etc. On the other hand, the set with most hospital training exceeded the low set in the recommendation of such "home" treatment as bed rest or exercise and advice relating to diet. It will be observed that the low set tended to provide more in the way of medicines while the high set, with most hospital training, seemed to rely more on natural agents and processes.

With the groups arranged according to specialist status, the following statistically significant differences were found between the set with the most specialists and the one with the fewest. There was a marked difference between the percentages of patients receiving a general examination, 50 percent as against 38. (In the middle group, the percentage was 34.) Similarly, there was considerable difference between the percentages of patients for whom no examination was recorded, 8 and 18. The high set provided 29 percent of their new patients with some X-ray services; the percentage in the low set was 19. One finding that should be pointed out is that while the high set for hospital training provided rectal examinations for the largest percentage of patients, the high set in specialist status provided such examinations for the smallest.

Only two categories of treatment showed a statistically valid difference between the high and low sets ranked according to specialist status. These were sedatives or stimulants (10 and 17 percent) and hormones (3 and 5 percent). The groups with the lowest proportion of specialists were the more frequent prescribers.

A more precise test of these differences is obtained when treatments are related to diagnosis. For this purpose, six of the more frequent diagnostic categories were selected, and the same criteria were applied, i. e., a consistent change from the high to the low sets and a statistically significant difference between the high and low sets.

For skin disease, there were no treatment categories which met these criteria. However, both the high and middle sets of groups with respect to specialist status provided minor surgery for more new



Percentage variation in services received by new patients in medical groups.

patients than did the low set (31, 32, and 16.5 percent, respectively).

In cases of trauma, the set with the highest average length of hospital training treated fewest patients with topical applications of drugs, 10 percent against 22 in the low set. The set with the highest specialist status provided the most immunizations, 11 percent as against 3.5.

In treating digestive diseases, the high set in hospital training made recommendations relating to diet for a higher proportion of their patients (44 percent) than was found for either the middle (19 percent) or low sets (21 percent). For diseases of the musculoskeletal and peripheroneural systems, the same high set prescribed home treatment more frequently (38 percent) than did the low set (14 percent).

Both low sets—in hospital training and specialist status—greatly exceeded the corresponding high sets in prescribing sedatives or stimulants for the upper respiratory diseases (27 percent as against 7, and 25 percent as against 8). The low set in specialist status also stood significantly higher than its corresponding high set in prescribing the sulfonamides (28 percent against 12) and such items as cough mixtures and nose drops (36 percent against 18).

For the cardiovascular diseases, the low set in hospital training relied significantly more often on such drugs as digitalis (19 percent against 2) and less often on home treatment such as rest (3 percent against 21). However, in the specialist sets, home treatment was prescribed least often by the high set (2 percent against 16).

Summary and Discussion

As part of the survey of medical groups, information was abstracted from the case records of a sample of 200 new patients in each of 16 groups. The information concerned age, sex, place of residence, and chief complaint of the patient, number of visits made, and the examination, tests, and treatments received during a period of 2 weeks. Primarily, the purpose of this part of the survey was to measure the kinds and amounts of services received by the patients of these medical groups in terms that would relate services to complaints and diagnoses as well as to other characteristics of the patients.

The following are some of the pertinent findings based on the total of 3,200 new patients:

1. The percentage of patients with a recorded complaint was 84. The most frequent complaints recorded were abdominal pain, injury, rash, and cough; these accounted for over 25 percent of the patients with complaints recorded.

2. Disorders of the skin were diagnosed in slightly more than 10 percent of the cases, and trauma in slightly less. These were the two most frequent categories of diagnosis.

3. During their first 2 weeks of contact with the medical group these new patients received an average of 1.5 visits, nearly all at the clinic. Less than 1 percent of the patients failed to see a physician at some time in the 2-week period, and 8 percent saw more than one physician in the interval.

4. About 40 percent of the patients received a general physical examination. Among males and females aged 45 and over, 42 percent received a rectal examination, and 40 percent of the females in the age group had a vaginal examination.

5. Urinalysis was performed for 30.5 percent of the patients, blood count for 29.5, and X-ray or fluoroscopy for 21.

6. Sedatives or stimulants (such as barbiturates and codeine) were the most frequent of all treatments, being prescribed for 13 percent of the patients. Minor surgery was performed for 12 percent.

Whether these findings indicate marked differences in the volume and types of services received by the patients of these medical groups as compared with the patients of individual practitioners cannot be determined because comparable data on the latter have not been collected or published. Nevertheless, this survey does reveal that data for such determination are obtainable from the records which most physicians routinely maintain. Notations on the records were frequently lacking for many items. Age was omitted in 19 percent of the cases, diagnosis in 20 percent, description of examination in 14 percent. Nevertheless, if the proportion of such omissions is no greater among medical groups in general and among individual practitioners, case records could be utilized more extensively than they have been for statistical studies of medical services.

The findings reveal marked variation from group to group in the types and amounts of services provided. The significance of this variation cannot be fully assessed without taking into consideration differences in the characteristics and medical needs of the patients. Such differences exist, as has been pointed out, with regard to age, sex, reason for coming to the clinic, diagnosis. A preliminary analysis reveals, however, that even after correcting for age—as in the case of rectal and vaginal examinations—or for diagnosis—as in the case of X-rays in respiratory diseases—certain groups provided certain services more frequently than others. In other words, some of the variations among groups must be due to differences among the physicians and their mode of practice. An indication of the factors which may be involved in these differences is obtained when the length of hospital training received by the physicians or their specialist status is related to the kinds and amounts of services received by the patients.

New patients of medical groups whose physicians had on the average the longest hospital training received, in the first 2 weeks, more general and rectal examinations, more X-ray services, and more prescriptions for home treatment and diet. They received relatively fewer prescriptions for topical applications, cathartics and the like, and vitamins. New patients of medical groups with relatively higher proportions of certified specialists received significantly more general examinations and X-ray services. They were treated less frequently than were patients in the other groups with sedatives and stimulants and hormones. When treatment was related to diagnosis, significant differences were also found among sets of groups classified as high or low with respect to the above characteristics, despite the fact that the numbers of cases were thus sharply reduced.

A more detailed statistical analysis of these differences is reserved for a later report. The above findings should be sufficient indication that at least two measurable characteristics of physicians are reflected in the services given to patients. The fact that these two characteristics, the amount of hospital training and specialist status, are also measures of the formal clinical training of medical practitioners is important because it points to the possibility of relating ~~this training~~ to the pattern of medical services furnished by practitioners.

On the basis of these findings, despite their preliminary character, it would appear that important statistical indices concerning kinds and amounts of medical services may be derived from data on the frequency of general, rectal, and X-ray examination; on the frequency with which treatment involves drugs such as sedatives or stimulants, hormones, analgesics, and digestives; and on the frequency with which physicians' records contain annotations on examination and diagnosis.

From the standpoint of medical care statistics, the results of this study clearly point to the value of examining critically the many variables on which data can be obtained to determine those criteria that may be used most effectively and meaningfully in analyzing the patterns of medical care.

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Polyvalent *Salmonella* "H" Agglutination as a Rapid Screening Test for *Salmonella* Organisms

By A. A. Hajna, M. S. and S. R. Damon, Ph. D.*

In the diagnostic laboratory, definitive identification of the Salmonelleae is often a time-consuming and laborious procedure. As a primary means of eliminating many confusing gram-negative nonsporeforming bacilli derived from the contents of the intestinal tract, a triple-sugar-iron (TSI) agar medium was introduced in 1945 (*1*) and by its use lactose-sucrose fermenting organisms are easily recognized and discarded. Even so, there often remain a considerable number of motile, non-lactose-sucrose fermenting, urease-test negative cultures resembling Salmonelleae which need further study before their significance can be evaluated. This often necessitates protracted culturing in lactose and sucrose broths supplemented by complete antigenic analysis, using the technique of Edwards and Bruner (*2*) or the simplified method of Kauffmann and Edwards (*3*). It is obvious, therefore, that serological typing (either simplified or complete) of organisms suspected of belonging to the genus *Salmonella* is both tedious and expensive and is a procedure which most laboratories doing routine diagnostic work are not in a position to carry out.

Since most *Salmonellas* are motile, consideration was given to the

Agglutinability of Salmonella-like organisms in Edwards' polyvalent Salmonella serum

Number cultures tested	Reactions in TSI agar after 24 hours incubation at 35° C.		Fermentation in carbohydrate broths		Motility test	Urease test	Number positive in polyvalent Salmonella "H" serum	Organisms identified as—
	Slant / Butt	H_2S	Lactose	Sucrose				
374	Neutral / Acid and gas	+	−	−	+	−	374	Members of *Salmonella* group.
3	Neutral / Acid and gas	−	−	−	+	−	3	*Salmonella paratyphi A.*
420	Neutral / Acid only	+(377) −(43)	−	−	+	−	401 (1 hr) 19 (2 hrs.)	*Salmonella typhosa.*
271	Neutral / Acid and gas	+	+271 (late)	−269 +2 (late)	+	−	0 (at end of 2 hrs.)	Paracolons, majority of the Bethesda group (Edwards).
69	Neutral / Acid and gas	−	+69 (late)	+69 (late)	+	−	0 (at end of 2 hrs.)	Paracolons, intermediates and coliforms (usually indole Pos.)

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possibility of using the "H" agglutination test as an aid to solution of the problem of screening out paracolon and other unimportant organisms resembling the Salmonelleae.

Consequently, a large series of urease-test negative cultures which gave suspicious reactions in "TSI" agar was subjected to polyvalent *Salmonella* "H" serum, with the results shown in the table. Those organisms which failed to agglutinate with the polyvalent serum were then inoculated into lactose and sucrose broths (corked) and were observed to ferment these carbohydrates after 3 to 10 days incubation at 35° C. and were proved culturally, as well as serologically, not to be members of the genus *Salmonella.* On the other hand, those organisms which agglutinated in the serum were likewise cultured and proved biochemically, as well as serologically, to be members of the genus *Salmonella* (*4*).

For preparation of the "H" agglutinating antigen, a special broth having the following composition was devised:

BBL-thiotone	10 gm.
Meat extract	3 gm.
Glucose	1 gm.
Sodium chloride	5 gm.
Dibasic potassium phosphate (K_2HPO_4)	2.5 gm.
Water (distilled)	1,000 ml.

These ingredients are dissolved in the Arnold sterilizer or in flowing steam in the autoclave before being dispensed in 5 to 6 ml. amounts in 16 x 150 mm. tubes (for screening and complete "H" analysis) or in 3 ml. amounts in 13 x 100 mm. tubes (for screening purposes only). The tubes are autoclaved at 121° C. for 15 to 17 minutes. Titration of the medium is unnecessary. Final pH will be about 7.2.

Tubes of this medium are inoculated with the organism under study and incubated overnight at 30° C. or at room temperature as suggested by Edwards (*5*). Cultures incubated at 37° C. generally yield poor or no flagella, therefore the maximum temperature of incubation should not exceed 30° C. Following incubation the cultures are diluted with an equal volume of physiological saline containing 0.6 percent formalin.

The "H" agglutination test is performed by placing 0.025 to 0.03 ml. of Edwards' pooled polyvalent *Salmonella* serum [1] at the bottom of an agglutination tube. One ml. of "H" antigen is then added, the tube shaken, and placed in a water bath for 1 hour, but not to exceed 2 hours, at 50° C. If, at the end of this time—1 to 2 hours—floccular agglutination is observed in the tube, it is an indication of the presence of *Salmonella* "H" antigens in the culture. A transfer of the culture from the "TSI" agar may either then be sent to a *Salmonella* typing center, or subjected to complete antigenic analysis—if sera are available—and at the same time inoculated into appropriate differential media for biochemical species identification.

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[1] Edwards' polyvalent *Salmonella* agglutinating serum consists of a pool of three separate polyvalent sera containing all the different *Salmonella* "H" and "O" anti-bodies including that of *Salmonella typhosa.* The pooled serum is diluted 1 in 5 with 0.3 percent formalinized physiological saline to which a few drops of chloroform have been added for further protection against contamination.

If, after incubation at 50° C. in the water bath for 2 hours, no "H" flocculation is observed, the tubes should remain in the water bath overnight for observation of "O" agglutination. If a fine, granular type of agglutination (the so-called "O" type of agglutination) is not observed after shaking, the organism under study has no "O" antigen of the genus *Salmonella.* Motile organisms failing to agglutinate in the polyvalent *Salmonella* "H" serum after 2 hours but agglutinating in the same serum after incubation overnight, usually are members of the paracolon group.

Edwards et al. (*6*) point out that some degree of discretion should be exercised in characterizing a culture as being "nonmotile" as they have found supposedly "nonmotile" cultures which flocculated well in "H" sera. However, they have pointed out such cultures usually do not flocculate with "H" sera until a fair degree of motility has been attained after serial transfers in Edwards and Bruner's (*2*) semisolid medium.

Recently Edwards et al. (*7*) reported their results of typing 12,331 *Salmonella* cultures between the years 1934 and 1947. Among these cultures were 37 nonmotile types of which a total of 9 were of human origin.

Since, in routine work several different colonies are, as a rule, picked from different agar plates, the number of nonmotile variants obtained is usually negligible. However, the experience of the writers indicates the desirability of employing the modified semisolid (motility) agar medium of Edwards and Bruner (*8*) in conjunction with the "TSI" agar to guide the technical worker to perform the polyvalent *Salmonella* "H" agglutination tests on suspected cultures.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JANUARY 7, 1950

For the current week, increases are noted in reported cases of communicable diseases for diphtheria (from 158 to 166), infectious encephalitis (from 11 to 13), influenza (from 2,620 to 4,077), measles (from 2,778 to 3,044), pneumonia (from 1,704 to 2,210), scarlet fever (from 1,214 to 1,232), and whooping cough (from 1,470 to 1,660) as compared with the preceding week.

Increases for influenza are noted in all geographic divisions except New England (no change), East North Central (from 72 to 35), and West North Central (from 24 to 19). The largest increase occurred in the West South Central Division (from 1,738 to 2,653) which is comprised of 4 States, including Texas which reported an increase of 959 cases (from 1,473 to 2,432). The remaining States in this division reported as follows: Arkansas, from 143 to 130, Louisiana, 1 each week, and Oklahoma from 121 to 90 cases.

In addition to Texas, the largest increases in reported cases of influenza occurred in Virginia (from 288 to 513), Alabama (from 39 to 188), Arizona (from 123 to 230), Colorado (from 9 to 54), Georgia (from 166 to 202), and Florida (from 2 to 24). Hawaii reported 484 cases of influenza for the week.

The increase in reported cases of pneumonia was chiefly in the West South Central Division which increased from 469 cases for last week to 735 currently. In this division Texas reported an increase of 209 cases (from 323 to 532). Additional States in the Nation showing largest increases were Virginia (from 58 to 158) and Georgia (from 21 to 123).

The increase in measles was evident in all geographic divisions except the East North Central and Pacific Divisions. The Mountain Division increased by 300 cases (from 243 to 543 cases). Utah, included in the Mountain Division, reported an increase of 208 cases (from 151 to 359).

One case of smallpox was reported in Kentucky.

A total of 9,713 deaths was recorded during the week in 94 large cities in the United States, as compared with 10,065 last week, 10,790 and 11,377, respectively, for the corresponding weeks of 1949 and 1948, and a 3-year median (1947–49) of 10,790. Infant deaths totaled 649, last week 656, same week last year 709, 3-year median 829.

Telegraphic case reports from State health officers for week ended January 7, 1950

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	---	---	---	78	1	18	---	---	15	---	---	1	17	---
New Hampshire	---	---	1	---	---	4	---	---	3	---	---	---	---	---
Vermont	---	---	---	2	---	---	---	---	---	---	---	---	22	---
Massachusetts	8	---	---	30	1	---	---	---	63	---	---	---	72	---
Rhode Island	---	---	---	1	---	3	---	---	12	---	---	---	10	---
Connecticut	---	---	---	11	1	39	4	---	14	---	---	---	110	---
MIDDLE ATLANTIC														
New York	3	---	(1)	251	3	273	5	---	[2] 62	---	---	2	192	18
New Jersey	1	3	4	398	1	127	3	---	38	---	---	---	172	---
Pennsylvania	6	---	---	99	3	84	2	---	71	---	---	---	160	2
EAST NORTH CENTRAL														
Ohio	7	---	3	47	7	68	2	---	199	---	1	2	96	4
Indiana	11	1	24	83	2	8	5	---	43	---	---	1	43	---
Illinois	6	1	---	98	6	94	2	---	49	---	4	1	65	4
Michigan	---	1	---	167	1	3	---	---	42	---	1	---	40	2
Wisconsin	---	1	8	99	1	13	9	---	42	---	---	---	80	1
WEST NORTH CENTRAL														
Minnesota	3	---	---	26	3	8	---	---	18	---	---	---	21	---
Iowa	---	---	---	137	1	1	2	---	13	---	---	---	9	4
Missouri	2	---	2	7	2	20	2	---	15	---	---	---	11	---
North Dakota	1	1	2	13	---	---	---	---	1	---	---	---	1	---
South Dakota	1	---	---	2	---	1	---	---	2	---	---	---	1	---
Nebraska	2	---	11	134	---	1	2	---	8	---	---	---	3	---
Kansas	2	---	4	4	---	20	2	---	28	---	---	---	4	---
SOUTH ATLANTIC														
Delaware	1	---	---	12	1	---	---	---	2	---	---	---	3	---
Maryland	---	---	1	12	2	51	1	1	17	---	1	---	41	---
District of Columbia	---	---	---	43	---	10	---	---	7	---	---	---	1	---
Virginia	9	---	513	30	2	158	1	---	45	---	1	2	63	1
West Virginia	4	---	63	130	2	20	---	---	23	---	---	---	23	3
North Carolina	7	---	---	97	5	---	3	---	52	---	---	1	20	---

South Carolina	10	1	5	52	1	9	---	---	4	---	---	1	5	5
Georgia	7	1	202	3	1	123	2	---	31	---	2	---	4	1
Florida	4	---	24	7	---	5	5	---	4	---	---	1	---	8
EAST SOUTH CENTRAL														
Kentucky	7	---	5	25	---	20	---	---	36	1	---	1	9	15
Tennessee	6	---	36	86	1	57	---	---	30	---	3	1	13	5
Alabama	5	---	188	12	1	42	2	---	17	---	---	1	9	9
Mississippi	6	1	9	49	1	31	---	---	2	---	---	---	---	2
WEST SOUTH CENTRAL														
Arkansas	6	---	130	51	---	76	5	---	2	---	2	1	2	1
Louisiana	10	---	1	1	1	35	3	---	2	---	2	2	2	---
Oklahoma	3	---	90	14	1	92	5	---	18	---	---	---	4	---
Texas	14	1	2, 432	80	6	532	12	---	46	---	2	2	106	25
MOUNTAIN														
Montana	---	---	8	42	---	---	---	---	7	---	1	---	3	---
Idaho	1	---	---	3	---	24	1	---	4	---	---	---	---	---
Wyoming	---	---	---	4	1	---	2	---	---	---	---	---	---	---
Colorado	---	---	54	76	1	37	---	---	5	---	---	1	16	10
New Mexico	1	---	---	4	---	14	---	---	5	---	---	---	8	---
Arizona	2	---	230	54	---	26	---	---	11	---	1	1	33	---
Utah	---	---	1	359	---	3	3	---	7	---	---	---	38	---
Nevada	---	---	---	1	---	1	1	---	---	---	---	---	---	---
PACIFIC														
Washington	---	---	5	81	3	1	2	---	33	---	---	2	24	---
Oregon	2	---	17	16	---	31	2	---	14	---	---	---	11	---
California	8	1	4	13	10	27	34	---	70	---	---	---	93	---
Total	166	13	4, 077	3, 044	73	2, 210	124	1	1, 232	1	21	24	1, 660	120
Median, 1945-49	361	5	4, 587	2, 995	85	---	57	---	2, 080	4	39	38	1, 746	---
Seasonal low week ends	(27th) July 9	---	(30th) July 30	(35th) Sept. 3	(37th) Sept. 17	---	(11th) Mar. 19	---	(32d) Aug. 13	(35th) Sept. 3	---	(11th) Mar. 19	(39th) Oct. 1	---
Since seasonal low week	4, 437	---	34, 607	22, 174	986	---	41, 584	---	17, 671	8	---	3, 181	23, 196	---
Median, 1944-45 to 1948-49	7, 932	---	40, 406	28, 893	1, 055	---	19, 061	---	28, 766	57	---	3, 566	26, 083	---

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[1] New York City.

[2] Including cases reported as streptococcal sore throat.

Alaska: Influenza 25, measles 24, pneumonia 3, scarlet fever 1.

Hawaii: Diphtheria 1, influenza 484, pneumonia 1.

CURACAO

Diphtheria.—Information dated January 4, 1950, states that an outbreak of diphtheria is causing concern to public health officials of the island of Curacao, Netherlands West Indies. During the week ended December 24, 1949, 19 new cases were registered there, and 22 cases during the week ended December 31. It is stated, however, that public health authorities do not consider that the situation has yet reached epidemic proportions.

JAPAN

Notifiable diseases—4 weeks ended November 26, 1949, and accumulated totals for the year to date.—Certain notifiable diseases have been reported in Japan as follows:

Disease	4 weeks ended November 26, 1949		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Anthrax			10	
Dengue fever			5	
Diarrhea, infectious	6		534	
Diphtheria	1,328	90	13,056	1,215
Dysentery, unspecified	595	253	23,553	6,800
Encephalitis, Japanese "B"	41	19	1,301	475
Gonorrhea	11,596		166,321	
Influenza	41		1,941	
Leprosy	60		719	
Malaria	85	6	3,647	61
Measles	2,443		161,580	
Meningitis, epidemic	56	18	1,397	415
Paratyphoid fever	120	9	2,084	105
Pneumonia	7,181		122,536	
Poliomyelitis	184		2,946	
Puerperal infection	58		875	
Rabies	7		68	
Scarlet fever	348	5	4,048	59
Smallpox	3		123	12
Syphilis	10,954		174,186	
Tetanus	171		2,013	
Trachoma	9,149		165,726	
Tuberculosis	30,592		431,920	
Typhoid fever	378	52	5,998	758
Typhus fever	5		102	6
Whooping cough	5,377		116,474	

NOTE.—The above figures have been adjusted to include delayed and corrected reports.

NEW ZEALAND

Notifiable diseases—4 weeks ended November 26, 1949.—Certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	1		Malaria	1	
Cerebrospinal meningitis	10		Poliomyelitis	11	
Diphtheria	6		Puerperal fever	2	
Dysentery:			Scarlet fever	78	
Amebic	2		Tetanus	2	1
Bacillary	14		Tuberculosis (all forms)	177	44
Erysipelas	11		Typhoid fever	5	
Food poisoning	5		Undulant fever	4	
Influenza	2				

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

(Cases)

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January–October 1949	November 1949	December 1949—week ended— 3	10	17	24	31
ASIA							
Burma	[1] 245	[2] 1	1	--------	--------	--------	--------
Bassein	183	--------	--------	--------	--------	--------	--------
Moulmein	2	[2] 1	1	--------	--------	--------	--------
Rangoon	[1] 3	--------	--------	--------	--------	--------	--------
Ceylon	2	--------	--------	--------	--------	--------	--------
Trincomalee	2	--------	--------	--------	--------	--------	--------
China:							
Amoy	[3] 1	--------	--------	--------	--------	--------	--------
India	84, 574	6, 272	38	72	54	37	33
Ahmedabad	1	--------	--------	--------	--------	--------	--------
Allahabad	17	--------	--------	--------	--------	--------	--------
Bombay	[2] 6	--------	--------	--------	--------	--------	--------
Calcutta	[1] 5, 107	175	38	72	54	37	--------
Cawnpore	190	--------	--------	--------	--------	--------	--------
Cocanada	12	--------	--------	--------	--------	--------	--------
Cuddalore	2	--------	--------	--------	--------	--------	--------
Lucknow	[1] 33	1	--------	--------	--------	--------	--------
Madras	433	--------	--------	--------	--------	--------	--------
Masulipatam	1	--------	--------	--------	--------	--------	--------
Nagpur	42	2	--------	--------	--------	--------	--------
Negapatam	26	--------	--------	--------	--------	--------	--------
New Delhi	[1] 20	--------	--------	--------	--------	--------	--------
Tuticorin	14	--------	--------	--------	--------	--------	--------
India (French):							
Karikal	55	--------	--------	--------	--------	--------	--------
Pondicherry	100	--------	--------	--------	--------	--------	--------
Indochina (French):							
Cambodia	45	--------	--------	--------	--------	--------	--------
Cochinchina	11	--------	--------	--------	--------	--------	--------
Pakistan	26, 219	[4] 267	--------	--------	--------	--------	--------
Chittagong	75	--------	--------	--------	--------	--------	--------
Dacca	99	[5] 2	--------	--------	--------	--------	--------
Lahore	[1] 24	--------	--------	--------	--------	--------	--------
Siam (Thailand)	9	--------	--------	--------	--------	--------	--------
Bangkok	8	--------	--------	--------	--------	--------	--------

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[1] Includes imported cases. [2] Imported. [3] Suspected. [4] For week ended Nov. 5, 1949 only. [5] Deaths.

PLAGUE

(Cases)

AFRICA							
Basutoland	42	--------	--------	--------	--------	--------	--------
Belgian Congo	[1] 15	1	--------	1	--------	1	--------
Costermansville Province	3	1	--------	1	--------	1	--------
Stanleyville Province	[1] 12	--------	--------	--------	--------	--------	--------
British East Africa:							
Kenya	5	--------	--------	--------	--------	--------	--------
Tanganyika	15	--------	--------	--------	--------	--------	--------
Madagascar	111	13	--------	--------	--------	--------	--------
Tananarive	6	--------	--------	--------	--------	--------	--------
Rhodesia, Northern	2	--------	--------	--------	--------	--------	--------
Union of South Africa	85	4	5	--------	--------	--------	--------
Cape Province	[2] [3] 45	3	[4] [5] 1	--------	--------	--------	--------
Orange Free State	[6] [7] 14	--------	--------	--------	--------	--------	--------
Southwest Africa	9	--------	[4] 3	--------	--------	--------	--------
Transvaal	4	--------	--------	--------	--------	--------	--------
ASIA							
Burma	[8] 449	2	1	10	--------	--------	--------
Mandalay	1	--------	--------	--------	--------	--------	--------
Moulmein	[8] 6	--------	--------	--------	--------	--------	--------
Pegu Town	--------	--------	--------	--------	1	--------	--------
Rangoon	[8] 8	--------	--------	--------	--------	--------	--------
Yenangyaung Town	--------	--------	--------	1	--------	--------	--------

See footnotes at end of table.

PLAGUE—Continued

Place	January-October 1949	November 1949	December 1949—week ended—				
			3	10	17	24	31
ASIA—continued							
China:							
Chahar Province	[9] 49						
Chekiang Province	7						
Wenchow	7						
Fukien Province	20						
Kiangsi Province	9						
India	29, 112	2, 090					
Indochina (French)	127	1					
Annam	68	1					
Cambodia	24						
Cochinchina	[10] 32						
Laos	3						
Java	460	191	49	36			
Jogjakarta Residency	427	191	49	35			
Siam (Thailand)	177	2					
EUROPE							
Portugal: Azores	5						
SOUTH AMERICA							
Brazil:							
Bahia State	13						
Ceara State	9						
Pernambuco State	19						
Ecuador:							
Loja Province	9	[11] 3					
Peru:							
Lambayeque Department	10						
Libertad Department	[12] 3						
Lima Department	8						
Piura Department	10						
Tumbes Department		1					
Venezuela:							
Aragua State	2						
OCEANIA							
Hawaii Territory		1					
Plague infected rats [13]	1	[14] 2					

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[1] Includes 2 cases of pneumonic plague. [2] Includes 14 suspected cases. [3] Includes 8 cases of pneumonic plague. Corrected figure. [4] Suspected. [5] Pneumonic plague. [6] Includes 3 suspected cases. [7] Includes 1 case of pneumonic plague. [8] Includes imported cases. [9] Deaths. [10] Includes 7 cases of pneumonic plague. [11] One case at Las Huertas, Celica County, 1 case at Palaza, Gonzanama County, 1 case at Guaiquichuma, Chaguarpamba. [12] Includes 2 cases reported Oct. 1-31, 1949, at Santa Rosa Farm, Trujillo Province. [13] Plague infection has also been reported in Hawaii Territory as follows: On Mar. 12, 1949, in mass inoculation of 2 pools of tissue from 10 rats (8 and 2), taken on Maui Island; on Mar. 16, 1949, in mass inoculation of 3 pools of 29 fleas (7, 12, and 10); on Aug. 4, 1949, in mass inoculation of 15 fleas, on Aug. 18, 1949, in a pool of 31 fleas, and on Sept. 15, 1949, in 49 fleas, all collected from rats taken on the Island of Hawaii. [14] Includes 1 mouse.

SMALLPOX

(Cases)

(P=present)

AFRICA							
Algeria	242	34					
Angola	[1] 681						
Basutoland	1						
Bechuanaland	4						
Belgian Congo	[1] 1, 903	137					
British East Africa:							
Kenya	25						
Nyasaland	1, 121	137	1	5			
Tanganyika	737	33					
Uganda	38						
Cameroon (British)	24						
Cameroon (French)	70						
Dahomey	430	29		[3] 1		[3] 6	
Egypt	4						
Eritrea	1						
Ethiopia	10						
French Equatorial Africa	379	32					
French Guinea	1						
French West Africa: Haute Volta	121						

See footnotes at end of table.

SMALLPOX—Continued

Place	January-October 1949	November 1949	December 1949—week ended—				
			3	10	17	24	31
AFRICA—continued							
Gambia	58	--------	--------	--------	--------	--------	--------
Gold Coast	52	--------	--------	--------	--------	--------	--------
Ivory Coast	298	41	--------	[2] 4	--------	--------	--------
Liberia	3	--------	--------	--------	--------	--------	--------
Morocco (French)	9	1	--------	--------	--------	[3] 1	--------
Morocco (International Zone)	[5] 2	--------	--------	--------	--------	--------	--------
Mozambique	297	37	--------	--------	--------	--------	--------
Nigeria	8,414	[4] 61	[4] 13	[4] 11	--------	--------	--------
Niger Territory	706	54	--------	[2] 25	--------	--------	--------
Portuguese Guinea	1	--------	--------	--------	--------	--------	--------
Rhodesia:							
Northern	9	2	--------	1	--------	--------	--------
Southern	702	--------	--------	--------	--------	--------	--------
Senegal	16	--------	--------	--------	--------	--------	--------
Sierra Leone	114	--------	--------	--------	--------	--------	--------
Sudan (Anglo-Egyptian)	[1] [5] 224	19	1	--------	10	1	--------
Sudan (French)	159	--------	--------	--------	--------	--------	--------
Togo (French)	148	--------	--------	--------	--------	--------	--------
Tunisia	1	--------	--------	--------	--------	--------	--------
Union of South Africa	1,083	50	1	1	--------	--------	--------
ASIA							
Afghanistan	214	--------	--------	--------	--------	--------	--------
Arabia	[5] 45	[5] 38	[5] 7	[5] 26	[5] 19	[5] 34	--------
Bahrein Islands	59	5	1	1	1	--------	--------
Burma	[5] 1,815	177	15	33	49	70	70
Ceylon	[6] 2	--------	--------	--------	--------	--------	--------
China	969	4	--------	--------	--------	--------	--------
India	64,467	1,980	[7] 95	[7] 113	[7] 131	[7] 198	[7] 227
India (French): Yanaon	1	--------	--------	--------	--------	--------	--------
India (Portuguese)	223	1	--------	--------	--------	--------	--------
Indochina (French)	2,492	37	2	97	7	5	--------
Iran	317	32	--------	--------	--------	--------	--------
Iraq	532	78	14	58	32	21	14
Israel	5	--------	--------	--------	--------	--------	--------
Japan	120	3	--------	--------	--------	--------	--------
Korea (Southern)	8,945	--------	--------	--------	--------	--------	--------
Lebanon	[5] 140	3	2	--------	--------	--------	--------
Malay States (Federated)	46	--------	--------	--------	--------	--------	--------
Manchuria: Port Arthur	9	--------	--------	--------	--------	--------	--------
Netherlands Indies:							
Java	12,379	390	37	43	32	--------	--------
Riouw Archipelago	2	--------	--------	--------	--------	--------	--------
Sumatra	[5] 215	3	2	--------	--------	--------	--------
Pakistan	3,834	21	11	12	12	13	--------
Palestine	87	101	--------	--------	--------	--------	--------
Philippine Islands:							
Mindoro Island	11	--------	--------	--------	--------	--------	--------
Romblon Island	[6] 4	--------	--------	--------	--------	--------	--------
Tablas Island	2	--------	--------	--------	--------	--------	--------
Portuguese Timor	4	--------	--------	--------	--------	--------	--------
Siam (Thailand)	102	1	--------	--------	7	--------	--------
Straits Settlements: Singapore	[5] 2	--------	--------	--------	--------	--------	--------
Syria	605	22	6	11	6	--------	--------
Transjordan	195	--------	--------	1	--------	--------	--------
Turkey. (See Turkey in Europe.)							
EUROPE							
Belgium	1	--------	--------	--------	--------	--------	--------
Germany (U. S. Zone)	1	2	--------	--------	--------	--------	--------
Great Britain: England and Wales	[5] 20	[8] 2	--------	--------	--------	--------	--------
Italy	[9] 98	--------	--------	--------	--------	--------	--------
Portugal	7	--------	--------	--------	--------	--------	--------
Spain	3	--------	--------	--------	--------	--------	--------
Canary Islands	6	--------	--------	--------	--------	--------	--------
Turkey	92	--------	--------	--------	--------	--------	--------
NORTH AMERICA							
Cuba: Habana	[5] 6	--------	--------	--------	--------	--------	--------
Guatemala	4	--------	--------	--------	--------	--------	--------
Mexico	[1] 126	2	1	--------	--------	--------	--------
SOUTH AMERICA							
Argentina	[1] 297	[10] 21	[10] 18	--------	[10] 7	--------	--------
Bolivia	35	--------	--------	--------	--------	--------	--------
Brazil	[1] 308	[10] 32	[10] 4	[10] 6	--------	--------	--------
Chile	[5] 2	--------	--------	--------	--------	--------	--------

See footnotes at end of table.

SMALLPOX—Continued

Place	January-October 1949	November 1949	December 1949—week ended—				
			3	10	17	24	31
SOUTH AMERICA—continued							
Colombia	[10] 2,454						
Ecuador	[1] 621	37					
Paraguay	[1] 8						
Peru	1,083	[11] 90					
Uruguay		[10] 2			[12] 8		
Venezuela	[1] 1,910						
OCEANIA							
Guam	2						

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[1] Includes alastrim. [2] Dec. 1-10, 1949. [3] Dec. 11-20, 1949. [4] In the port of Lagos. [5] Includes imported cases. [6] Imported. [7] Reported in ports only. [8] Laboratory case and contact. [9] Includes 95 cases of varioloid reported in Rome Jan. 1-June 10, 1949. [10] Alastrim. [11] Sept.-Dec. 6, 1949. outbreak in the port of Pacasmayo. [12] Nov. 27-Dec. 17, 1949.

TYPHUS FEVER *

(Cases)

(P—present)

Place	January-October 1949	November 1949	December 1949—week ended—				
			3	10	17	24	31
AFRICA							
Algeria	75	11					
Basutoland	25						
Belgian Congo	[1] 42						
British East Africa:							
Kenya	76						
Nyasaland	4						
Tanganyika	1						
Egypt	177	4					
Eritrea	71	3	5				
Ethiopia	550						
Gold Coast	3						
Libya	180	5	3				
Cyrenaica	19		2				
Tripolitania	161	5	1				
Madagascar: Tananarive	[2] 10						
Morocco (French)	17	2		[3] 1			
Morocco (Spanish)	29						
Sierra Leone	[1] 2						
Tunisia	70	2					
Union of South Africa	143	14	P				
ASIA							
Afghanistan	1,575						
Arabia: Aden	[4] 2						
Burma	5						
Ceylon: Colombo	[1] 5	1					
China	55	3					
India	236	1					
India (Portuguese)	61	11					
Indochina (French)	19	2	2			1	
Iran	166	6					
Iraq	71	17	3	2	4	5	4
Japan	97	5	2		1		
Korea (Southern)	[2] 1,179	3					
Lebanon	[2] 4						
Pakistan	592	1	1		10		
Palestine	110	4					
Philippine Islands: Manila	[1] 1						
Straits Settlements: Singapore	[2] 3	[1] 2					
Syria	24	3		1	1		
Transjordan	60	3		2	2	2	
Turkey. (See Turkey in Europe.)							
EUROPE							
Belgium	[2, 4] 5						
Bulgaria	393						
Czechoslovakia	22						
France	5						
Great Britain:							
England and Wales	[1, 5] 4						
Malta and Gozo	[1] 23	5					
Greece	[2] 58	13				1	
Hungary	20						

See footnotes at end of table.

TYPHUS FEVER—Continued

Place	January-October 1949	November 1949	December 1949—week ended—				
			3	10	17	24	31
EUROPE—continued							
Italy	[2] 26	1					
Sicily	21						
Poland	315						
Portugal	6						
Rumania	417						
Spain	7						
Turkey	186	25	5	3	10	7	3
Yugoslavia	195	9					
NORTH AMERICA							
Bahama Islands: Nassau	[1] 1						
Costa Rica [1]	48	1					
Cuba [1]	3	2					
Guatemala	47						
Jamaica [1]	19						
Mexico [2]	213	21	2	[6] 7			
Panama Canal Zone [1]	12						
Panama (Republic)	[1] 5						
Puerto Rico [1]	43	1					
SOUTH AMERICA							
Argentina [1]	2						
Bolivia	53						
Brazil	[2] 6						
Chile [2]	343	16	3				
Colombia [2]	2,401	8					
Curacao [1]	5						
Ecuador [2]	309	21					
Peru	1,103						
Venezuela [2]	98	2	1				
OCEANIA							
Australia [1]	117	8	3	3			
Hawaii Territory [1]	16	1		1			

*Reports from some areas are probably murine type, while others include both murine and louse-borne types.

[1] Murine type. [2] Includes murine type. [3] Dec. 1–10, 1949. [4] Includes imported cases. [5] Imported [6] Includes 5 cases reported for the period Nov. 27–Dec. 10, 1949.

YELLOW FEVER

(C=cases; D=deaths)

AFRICA							
Belgian Congo:							
Stanleyville Province——D	5						
French Equatorial Africa:							
Bangui——D	1						
Gold Coast——C	26						
Accra——D	1						
Birim District——C	[1] 3						
Komenda Village [3]——D	1						
Nkwanta Dunkwa Area——D	1						
Oda Area:							
Akwatia——C	[3] 5						
Atiankama——C	[4] 1						
Bawdua——C	[4] 3						
Esuboni——C	[4] 3						
Oseikrome Village——D	1						
Winneba Area:							
Apam——D	1						
Akukuom——D	1						
Nyakrom——C	[5] 5						
Nigeria:							
Kaduna——D	1						
Lagos——D	[6] 2						
Sierra Leone:							
Freetown——D				1			
Koinadugu District——C					[4] 1		
Sudan (French):							
Bamako——D	[4] 1						

See footnotes at end of table.

YELLOW FEVER—Continued

Place		January-October 1949	November 1949	December 1949—week ended—				
				3	10	17	24	31
NORTH AMERICA								
Panama:								
Colon Province	D	3						
Pacora	C	[7] 8						
SOUTH AMERICA								
Brazil:								
Acre Territory	D	1						
Amazonas State	D	1						
Para State	D	3						
Ecuador:								
Napo Pastaza Province	D	1						
Peru:								
Cuzco Department	D	3						
San Martin Department	D	1						

[1] Includes 2 suspected cases. [2] Near seaport of Sekondi. [3] Includes 1 suspected case. [4] Suspected. [5] Includes 2 suspected cases (1 fatal), and 3 fatal confirmed cases. [6] Imported. [7] Reported Jan. 15, 1949. Date of occurrence Nov. 11–Dec. 30, 1948; 5 cases (all fatal) confirmed, 3 suspected cases.

✦ ✦ ✦

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

VOLUME 65 FEBRUARY 3, 1950 NUMBER 5

TUBERCULOSIS CONTROL ISSUE NO. 48

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Tuberculosis Hospital Planning

1798

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
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Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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Public Health Reports

Vol. 65 • FEBRUARY 3, 1950 • *No. 5*

The Action of Streptomycin and Usnic Acid on the Development of Tuberculosis in Guinea Pigs

By ALFRED MARSHAK, PH. D. and MARVIN KUSCHNER, M. D.*

In 1947, Marshak (*1*) demonstrated the marked *in vitro* antibacterial action of usnic acid on *M. tuberculosis*, a finding since confirmed by Stoll, Brack, and Renz (*2*), Barry et al. (*3*), and Shibata, Ukita, et al. (*4*). At that time additional experiments in which usnic acid was administered to a relatively small number of guinea pigs infected with human tubercle bacilli seemed to indicate that the drug effected definite retardation of the disease.

The work herein reported was undertaken in order to reexamine the effect of the drug on experimentally induced tuberculosis in a larger number of animals, to compare the efficacy of the drug with that of streptomycin and to test for possible synergistic action in combination with streptomycin.

Methods and Materials

Tubercle bacilli of the strain $H_{37}RV$ were isolated from a guinea pig on Loewenstein's medium, transferred to Dubos medium, then transferred again to Dubos for 10 days, at which time each guinea pig in this study was infected by inoculation with .02 mg. dry weight of this culture.

The animals used were all of the Hartley strain (*5*, *6*). Ninety-nine virgin female guinea pigs were divided into five groups so that each group had a similar weight distribution and a mean weight of approximately 400 grams. The range in weight was 332 to 498 grams. Group I contained 19 guinea pigs; the other four groups contained 20 each.

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*From the Field Studies Branch, Division of Tuberculosis, Public Health Service and New York University-Bellevue Medical Center. The author wishes to acknowledge the technical assistance of Audrey Peck of New York University-Bellevue Medical Center, and of Martha Behan, Mary Geitner, Etta Greenleaf, and Philip Green of the Bureau of Laboratories, New York City Department of Health.

This is the forty-eighth of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which will appear in the first week of each month. The series began with the March 1, 1946, issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

Group I, the control group, was untreated.

Group II received 20 mg. of usnic acid in oil-Tween 80 mixture subcutaneously every day for 6 days, then 10 mg. daily for 24 days.

Group III received 3 mg. of streptomycin twice daily for 30 days.

Group IV received 1 mg. of streptomycin twice daily for 30 days.

Group V received 20 mg. of usnic acid in oil-Tween 80 mixture for 6 days, then 10 mg. daily for 24 days. In addition, this group received 2 mg. of streptomycin daily for the 30-day treatment period.

In all groups treatment was started on the day following inoculation with tubercle bacilli and maintained for 30 days. All animals were weighed every 2 or 3 days. All surviving animals were sacrificed 41 to 44 days after inoculation or 11 to 14 days after cessation of treatment. All animals were autopsied, and the lungs, liver and spleen, the organs chosen for assay, were fixed in 10 percent formalin. Gross estimates of the extent and severity of the disease in the lungs and liver were made by counting all nodular lesions seen on the surface of these organs and those seen on multiple cross-section 5 mm. apart in each organ. The number of such lesions, their size and confluency determined the grading of lungs and liver as 0—no disease; 1—minimal disease; 2—slight disease; 3—moderate disease, or 4—marked disease. Because of the difficulty in distinguishing Malpighian corpuscles from focal, nodular tuberculous lesions in the spleen, it was found impracticable to count lesions in that organ. Accordingly, the spleen was graded from 0 to 3, that is, no disease, slight, moderate or marked involvement, depending upon enlargement, capsular thickening, and bulging of obvious lesions through the capsule.

Paraffin sections of the lungs, liver, and spleen of each animal were stained with hematoxylin and eosin and duplicate sections were prepared and stained by the Ziehl-Neelsen method. The organs were then graded again on the basis of microscopic findings. The criteria for grading were size of the lesion, type of cellular reaction, and presence or absence of necrosis. It was found that tubercle bacilli were so rare in all lesions that they could not be taken into account in the grading. On the basis of microscopic findings, all organs were graded 0, 1, 2, 3, or 4.

Results

There were five deaths in the entire group of 99 animals. All five were in group V, the group which received combined streptomycin and usnic acid therapy. These animals died 7, 12, 27, 31 and 34 days after inoculation. None of the five died of tuberculosis. In the animal which died 7 days after inoculation, evidence was found of direct injection of the drug into the peritoneal cavity, but there was no peritonitis. There was no evidence of tuberculosis nor any apparent morphologic lesion to explain the death. The animal which died 12 days after inoculation was found to have an extensive area of

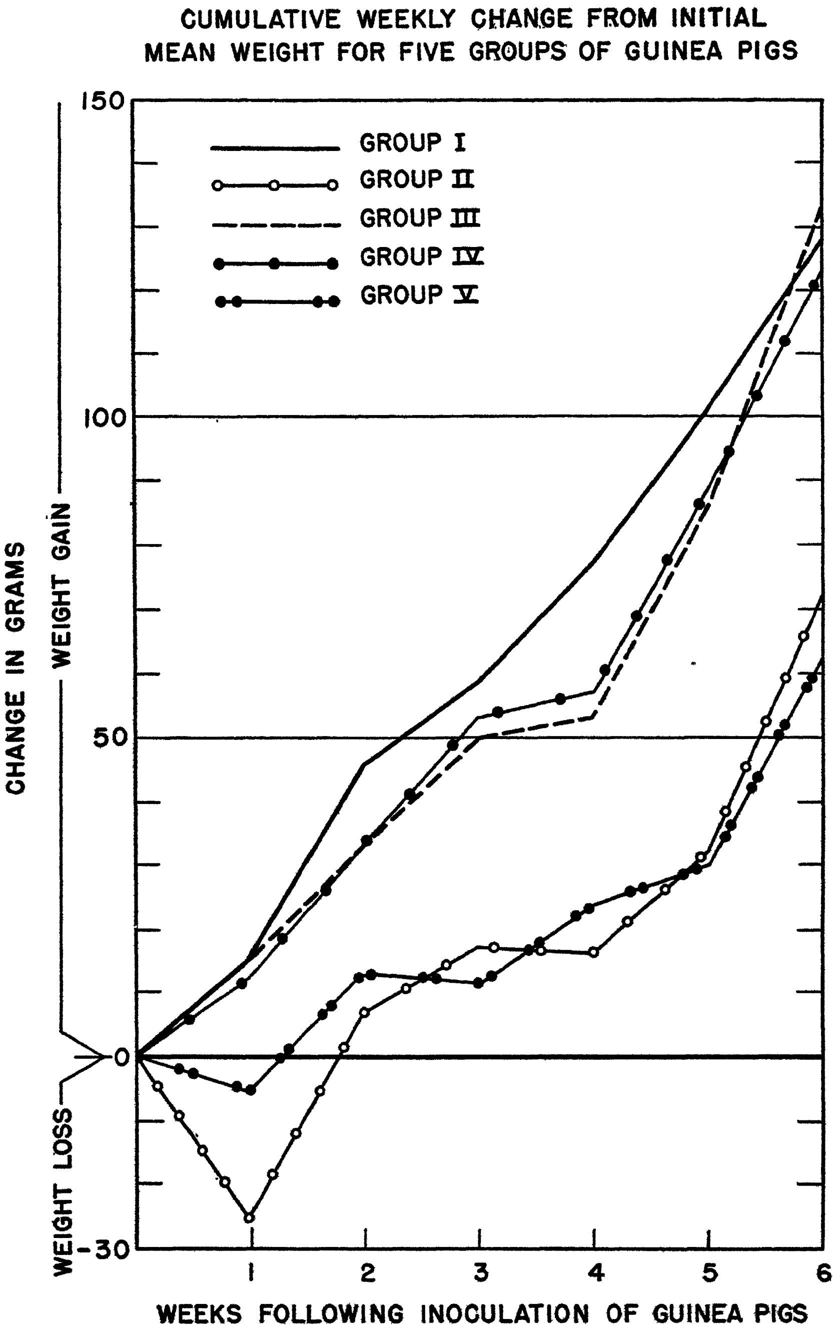
CUMULATIVE WEEKLY CHANGE FROM INITIAL MEAN WEIGHT FOR FIVE GROUPS OF GUINEA PIGS
GROUP I
GROUP II
GROUP III
GROUP IV
GROUP V
CHANGE IN GRAMS
WEIGHT GAIN
WEIGHT LOSS
150
100
50
0
-30
1
2
3
4
5
6
WEEKS FOLLOWING INOCULATION OF GUINEA PIGS

Figure 1.

necrosis in the liver which microscopically resembled an infarct. The possibility of direct injection of the drug into the liver could not be ruled out. Again there was no evidence of tuberculosis. The animal which died 27 days after inoculation had moderate tuberculous lesions in the lungs, liver, and spleen. These were not severe enough to explain the death of the animal; however, no other cause was found. The animals which died 31 and 34 days after inoculation both had extensive acute pneumonia. These animals were cage mates. Both had minimal tuberculous lesions in the liver and spleen. All five animals were excluded from the calculations of variations in mean weights and in the estimations of severity of disease.

Weights. The weekly mean weights for each group and the change between the initial weight and the weight for each succeeding week are presented in table 1, and the change in weight is represented graphically in figure 1. It may be seen that the rates of gain and the final total gain in groups, I, III and IV are fairly comparable. In groups II and V, however, both of which received usnic acid, there was little gain in weight until after the cessation of therapy at the fourth week.

Table 1. *Weekly mean weight and cumulative weekly change from initial mean weight for five groups of guinea pigs*

Group	Initial mean weight	Weekly mean weight (grams)						Cumulative weekly change (grams) from initial mean weight					
		1st week	2d week	3d week	4th week	5th week	6th week	1st week	2d week	3d week	4th week	5th week	6th week
I Control	409	424	455	468	486	510	537	+15	+46	+59	+77	+101	+128
II Usnic acid	397	372	404	414	413	429	469	−25	+7	+17	+16	+32	+72
III Streptomycin-6 mg./day	403	418	436	453	456	489	536	+15	+33	+50	+53	+86	+133
IV Streptomycin-2 mg./day	402	414	435	455	459	491	525	+12	+33	+53	+57	+89	+123
V Usnic acid+streptomycin-2 mg./day	411	406	424	422	435	441	474	−5	+13	+11	+24	+30	+63

Severity of Disease. Within each group, the gross findings in the liver, spleen and lungs are presented in table 2 according to severity of disease; and represented graphically in figures 2, 3, and 4, respectively. In groups III and V (6 mg. streptomycin daily, and 2 mg. streptomycin plus 10 mg. usnic acid), 85 to 94 percent of the animals had either no evidence of disease in the liver (category 0), or the mildest form (category 1). In striking contrast only 10 to 40 percent of the animals in the other groups fell into severity categories 0 and 1 (fig. 2). Evaluation of gross lesions in the spleen (fig. 3) gave a similar distribution. Although the distribution of lung lesions (fig. 4) in general tends to suggest lesser lesions in groups III and V, these differences are not completely consistent particularly because 31 percent of the animals in group I showed no gross lesions of the lungs.

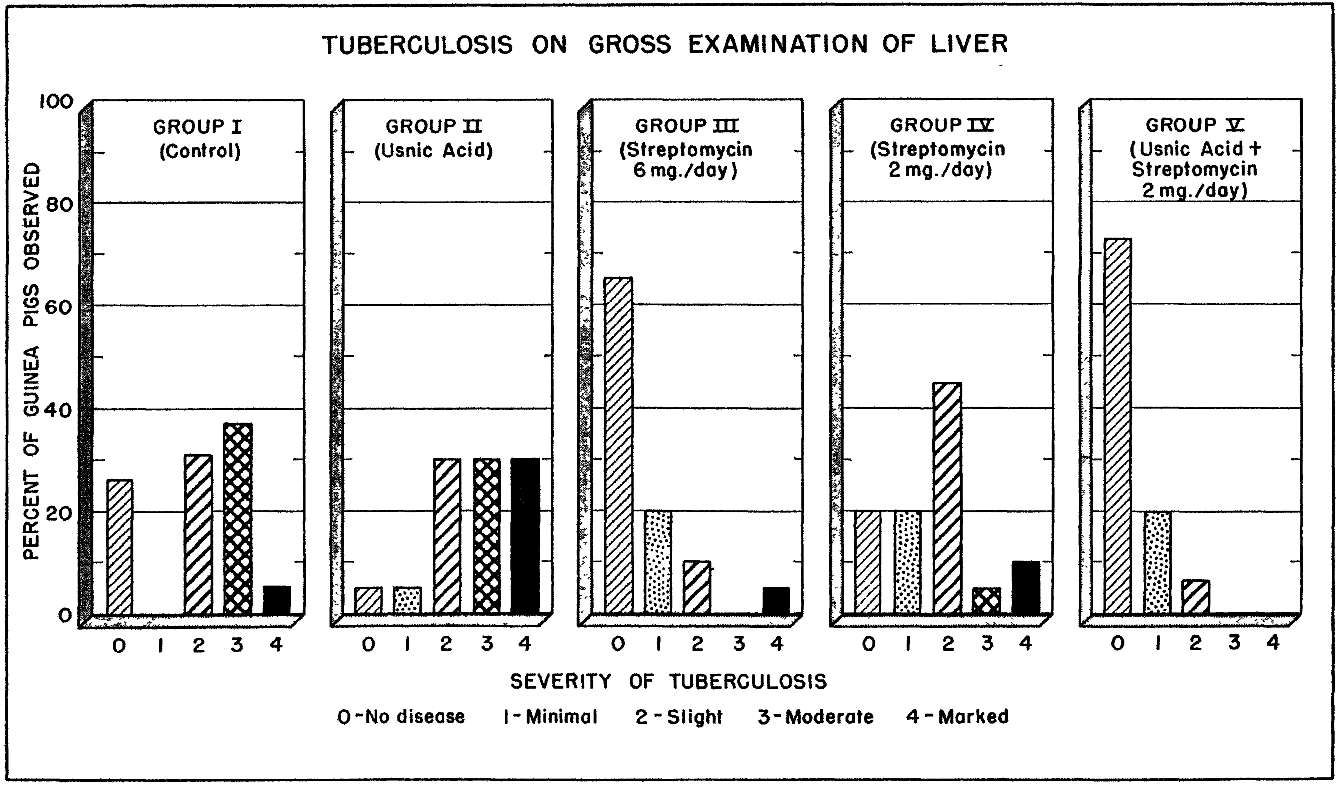
TUBERCULOSIS ON GROSS EXAMINATION OF LIVER
PERCENT OF GUINEA PIGS OBSERVED
100
80
60
40
20
0
GROUP I (Control)
GROUP II (Usnic Acid)
GROUP III (Streptomycin 6 mg./day)
GROUP IV (Streptomycin 2 mg./day)
GROUP V (Usnic Acid + Streptomycin 2 mg./day)
0 1 2 3 4
SEVERITY OF TUBERCULOSIS
0 - No disease
1 - Minimal
2 - Slight
3 - Moderate
4 - Marked

Figure 2.

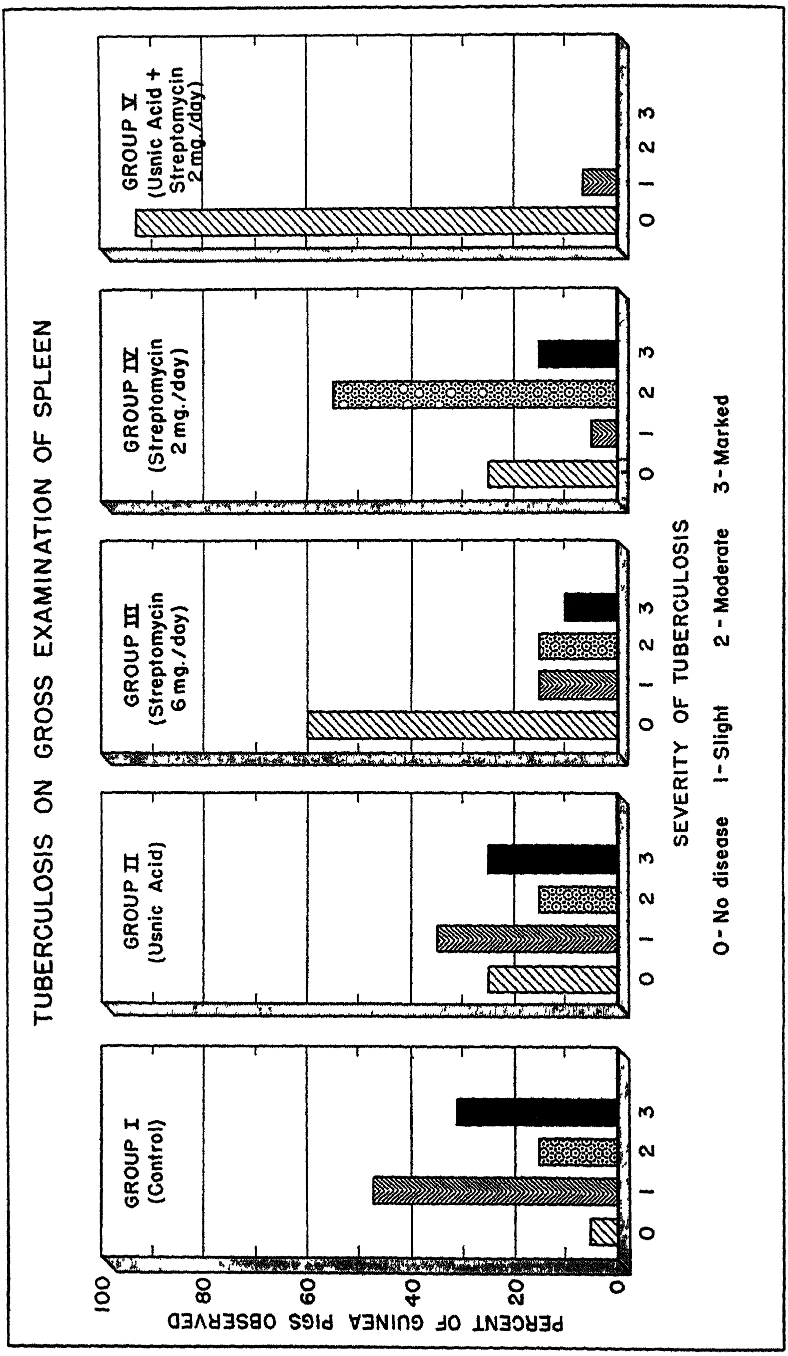
TUBERCULOSIS ON GROSS EXAMINATION OF SPLEEN
GROUP I (Control)
GROUP II (Usnic Acid)
GROUP III (Streptomycin 6 mg./day)
GROUP IV (Streptomycin 2 mg./day)
GROUP V (Usnic Acid + Streptomycin 2 mg./day)
PERCENT OF GUINEA PIGS OBSERVED
0
20
40
60
80
100
0
1
2
3
SEVERITY OF TUBERCULOSIS
0 - No disease
1 - Slight
2 - Moderate
3 - Marked

Figure 3.

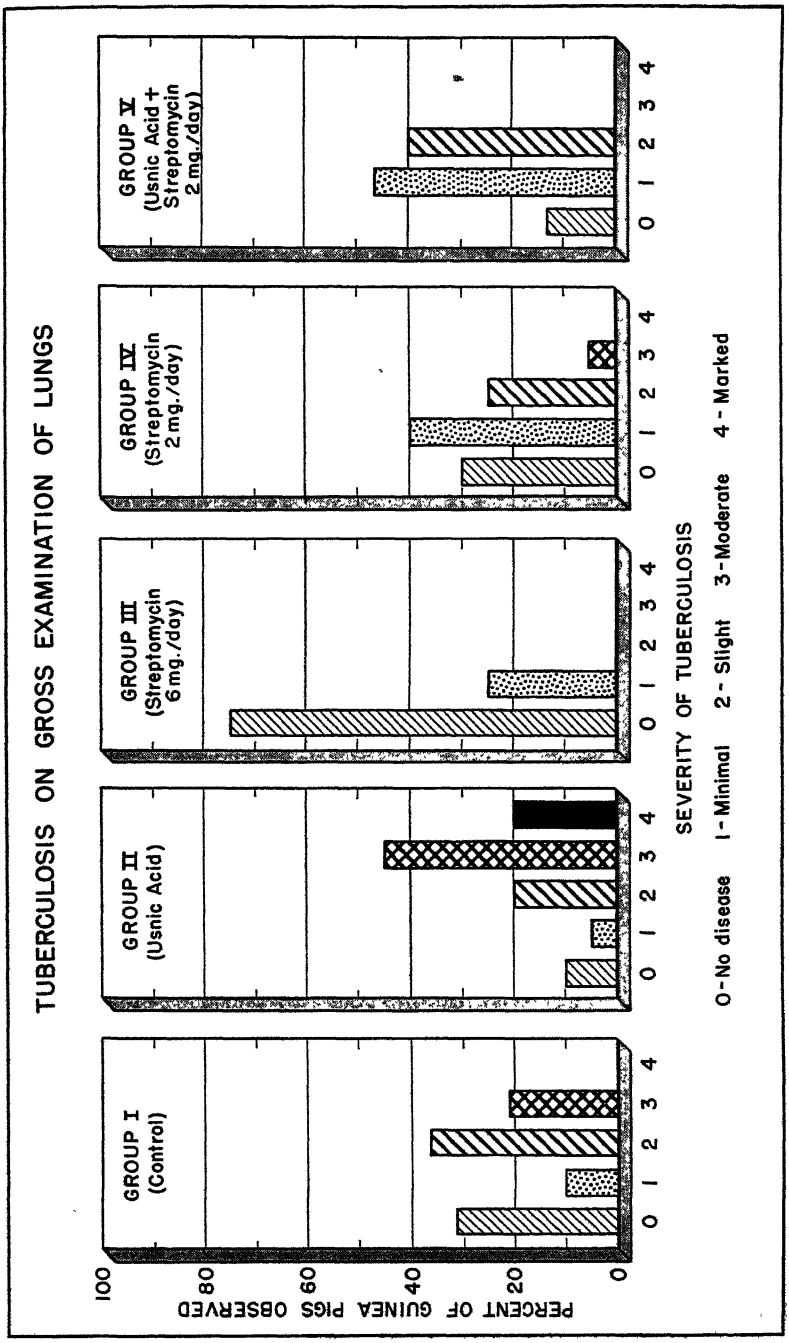
TUBERCULOSIS ON GROSS EXAMINATION OF LUNGS
GROUP I (Control)
GROUP II (Usnic Acid)
GROUP III (Streptomycin 6 mg./day)
GROUP IV (Streptomycin 2 mg./day)
GROUP V (Usnic Acid + Streptomycin 2 mg./day)
PERCENT OF GUINEA PIGS OBSERVED
0
20
40
60
80
100
0
1
2
3
4
SEVERITY OF TUBERCULOSIS
0 - No disease
1 - Minimal
2 - Slight
3 - Moderate
4 - Marked

Figure 4.

One of the difficulties here, and this remains true even after microscopic examination, is the tendency to confuse with tuberculous lesions many of the nonspecific infiltrates to which guinea pigs are subject. Because the gross and microscopic lesions of tuberculosis are much more specific and more easily identified in the liver and spleen, we believe that these organs are more useful than the lungs for assaying the severity of disease.

Table 2. *Percent of animals in each group showing tuberculosis according to assigned categories of severity on gross examination of the liver, spleen, and lungs*

Category of severity of tuberculosis	I Control	II Usnic acid	III Streptomycin 6 mg./day	IV Streptomycin 2 mg./day	V Usnic acid +streptomycin
	Liver				
0—No disease	26.3	5.0	65.0	20.0	73.5
1—Minimal	-----	5.0	20.0	20.0	20.0
2—Slight	31.5	30.0	10.0	45.0	6.6
3—Moderate	36.9	30.0	-----	5.0	-----
4—Marked	5.3	30.0	5.0	10.0	-----
	Spleen				
0—No disease	5.3	25.0	60.0	25.0	93.3
1—Slight	47.5	35.0	15.0	5.0	6.6
2—Moderate	15.7	15.0	15.0	55.0	-----
3—Marked	31.5	25.0	10.0	15.0	-----
	Lungs				
0—No disease	31.5	10.0	75.0	30.0	13.3
1—Minimal	10.6	5.0	25.0	40.0	46.7
2—Slight	36.9	20.0	-----	25.0	40.0
3—Moderate	21.0	45.0	-----	5.0	-----
4—Marked	-----	20.0	-----	-----	-----

Table 3 and figures 5, 6, and 7 give the results of the microscopic grading of lesions. For both the liver (fig. 5) and the spleen (fig. 6) microscopic examination produces observations similar to those obtained by gross inspection. Microscopic examination of the lesions in the liver, for example, discloses that 55 to 73 percent of the animals in groups III and V had either no lesion (category 0) or those of least severity (category 1), while, in the other groups, most of the animals were rated in severity category 2 or higher.

In general, distribution of lesions in the lung (fig. 7) is similar to that seen in the livers and spleens. The 53 percent of animals in group V which showed lung lesions of grades 2 and 3 is not consistent with this general pattern, and here again, as in the gross examination, we believe that the difficulties in accurate diagnosis in this organ introduce an unavoidable error in these estimates.

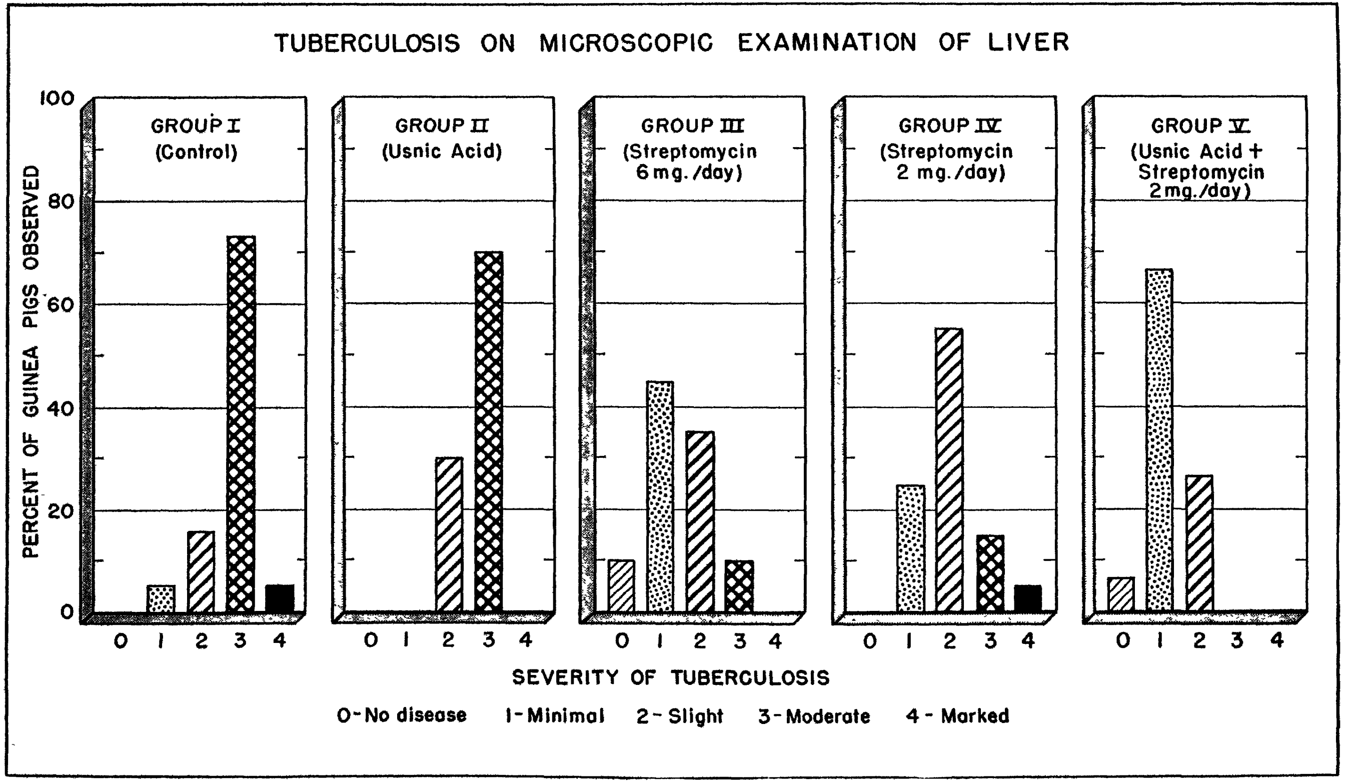
TUBERCULOSIS ON MICROSCOPIC EXAMINATION OF LIVER
PERCENT OF GUINEA PIGS OBSERVED
100
80
60
40
20
0
GROUP I
(Control)
GROUP II
(Usnic Acid)
GROUP III
(Streptomycin
6 mg. /day)
GROUP IV
(Streptomycin
2 mg./day)
GROUP V
(Usnic Acid +
Streptomycin
2 mg./day)
0 1 2 3 4
SEVERITY OF TUBERCULOSIS
0 - No disease
1 - Minimal
2 - Slight
3 - Moderate
4 - Marked

Figure 5.

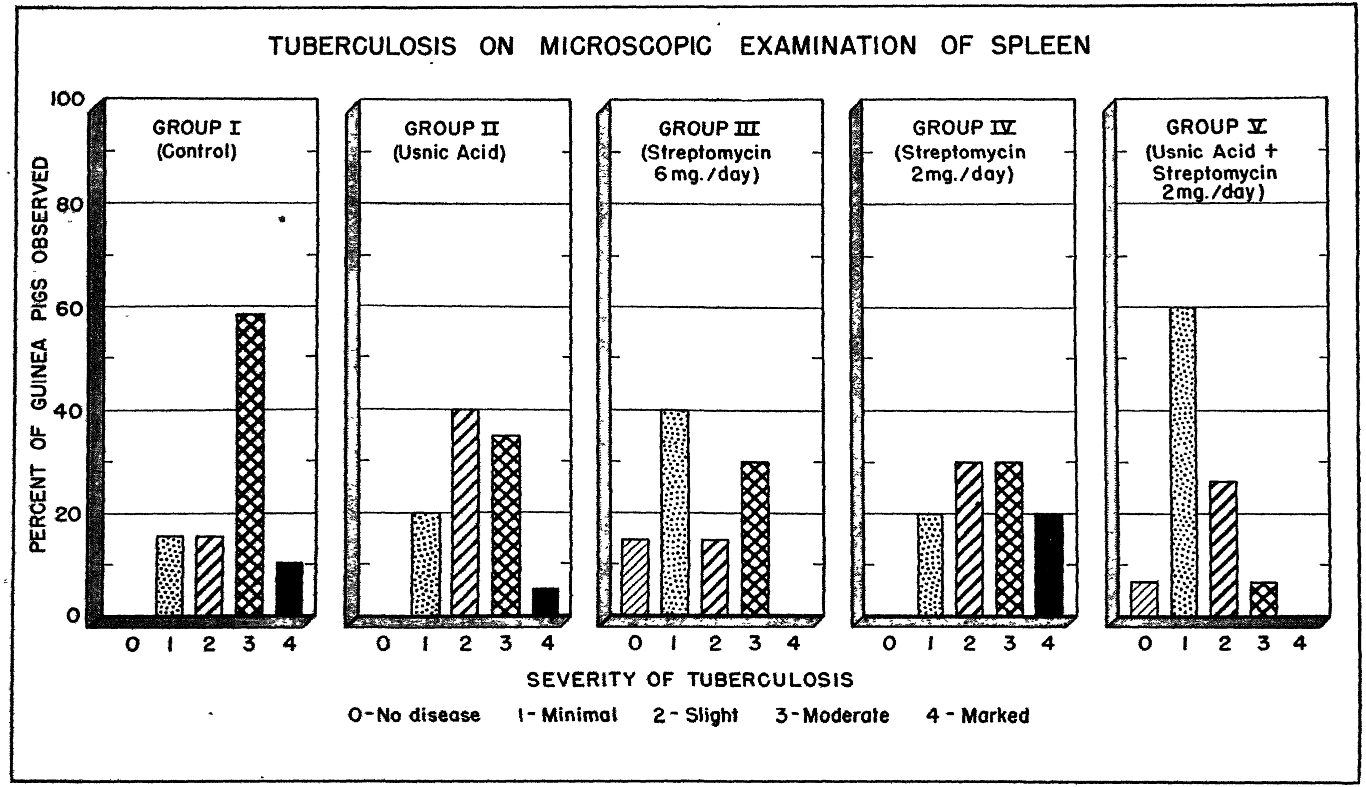
TUBERCULOSIS ON MICROSCOPIC EXAMINATION OF SPLEEN
PERCENT OF GUINEA PIGS OBSERVED
100
80
60
40
20
0
GROUP I (Control)
GROUP II (Usnic Acid)
GROUP III (Streptomycin 6 mg./day)
GROUP IV (Streptomycin 2mg./day)
GROUP V (Usnic Acid + Streptomycin 2mg./day)
0 1 2 3 4
SEVERITY OF TUBERCULOSIS
0-No disease
1-Minimal
2-Slight
3-Moderate
4-Marked

Figure 6.

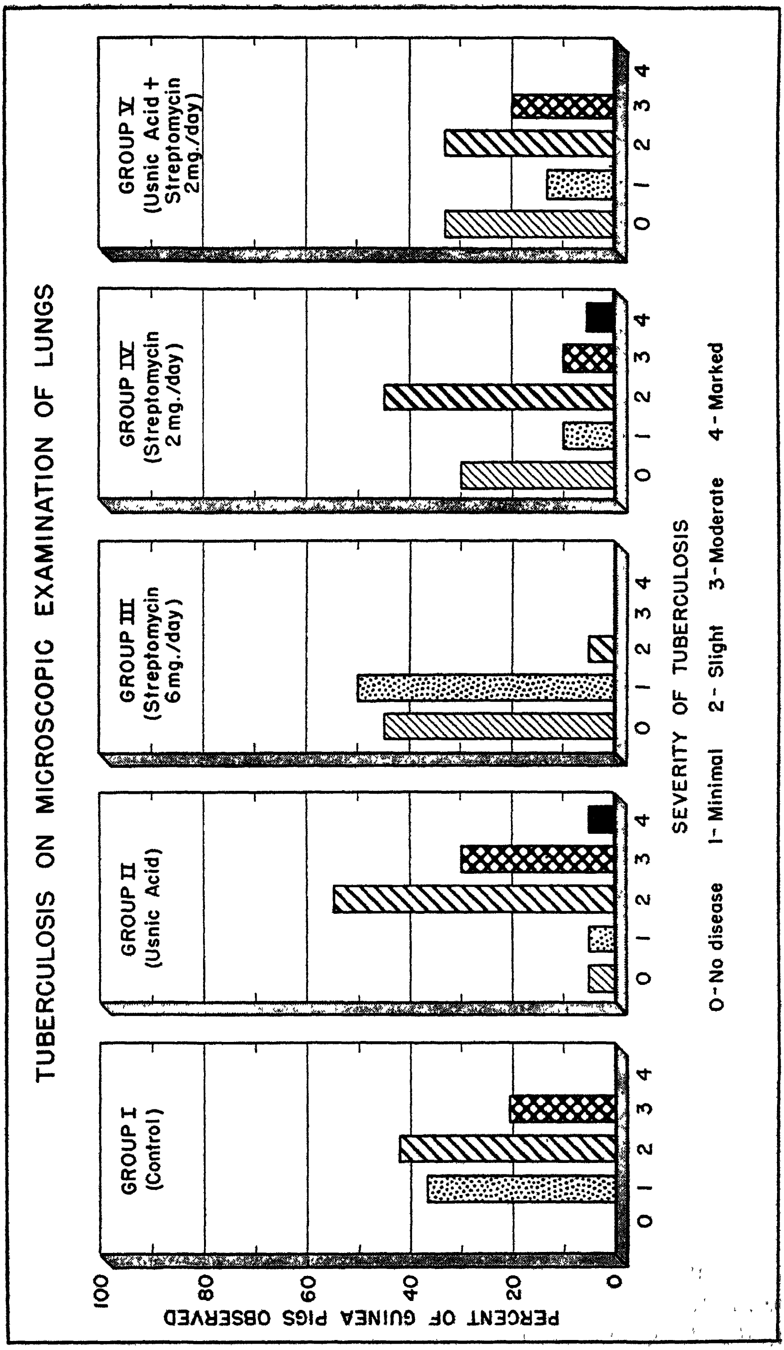
TUBERCULOSIS ON MICROSCOPIC EXAMINATION OF LUNGS
PERCENT OF GUINEA PIGS OBSERVED
100
80
60
40
20
0
GROUP I (Control)
GROUP II (Usnic Acid)
GROUP III (Streptomycin 6mg./day)
GROUP IV (Streptomycin 2 mg./day)
GROUP V (Usnic Acid + Streptomycin 2mg./day)
0
1
2
3
4
SEVERITY OF TUBERCULOSIS
0-No disease
1-Minimal
2-Slight
3-Moderate
4-Marked

Figure 7.

Table 3. *Percent of animals in each group which showed tuberculosis according to assigned categories of severity on microscopic examination of the liver, spleen, and lungs*

Category of severity of tuberculosis	I Control	II Usnic acid	III Strepto-mycin 6 mg./day	IV Strepto-mycin 2 mg./day	V Usnic acid +strepto-mycin
			Liver		
0—No disease	-----	-----	10.0		6.6
1—Minimal	5 3	-----	45.0	25.0	66.7
2—Slight	15.7	30.0	35.0	55.0	26.7
3—Moderate	73.7	70 0	10.0	15.0	-----
4—Marked	5.3	-----	-----	5.0	-----
			Spleen		
0—No disease	-----	-----	15.0	-----	6.6
1—Minimal	15.7	20.0	40.0	20.0	60.0
2—Slight	15.7	40.0	15.0	30.0	26.7
3—Moderate	58.0	35.0	30.0	30 0	6.6
4—Marked	10.6	5.0	-----	20.0	-----
			Lungs		
0—No disease	-----	5.0	45.0	30 0	33.3
1—Minimal	36.9	5.0	50.0	10.0	13.4
2—Slight	42.1	55.0	5.0	45.0	33 3
3—Moderate	21.0	30.0	-----	10.0	20 0
4—Marked	-----	5.0	-----	5.0	-----

Comment

The absence of any deaths from tuberculosis in the 6 weeks following inoculation of a dose of tubercle bacilli of .02 mg. was of interest. Perhaps even more surprising was the fact that no group, not even the control group (group I), experienced weight loss. This could be due either to an attenuation of the culture or to a fair degree of natural resistance in the group of guinea pigs used. In view of the known virulence of $H_{37}RV$ and the fact that the particular strain used was isolated from a guinea pig dead of extensive tuberculosis, it would appear that the latter possibility is the more likely one. Nevertheless, since only two animals (both in group III) showed no disease in lungs, liver, and spleen, since many animals showed widespread disease, and since even the two with uninvolved viscera had infected inguinal nodes, it seems likely that many would eventually have succumbed to tuberculosis had they not been sacrificed. The experiment was terminated after 41 days in order that possible recrudescence of disease in the treated animals after cessation of treatment might not obscure any retardation effected by treatment.

The fact that the animals which received usnic acid (groups II and V) failed to gain weight during the period of treatment to the same extent as the controls and their gain after the end of treatment suggest a toxic action of the mixture of usnic acid and oil-Tween. The amount given was approximately one-third of the lethal dose.

Administration of oil-Tween alone produced no such inhibition of gain in weight. (*1*).

Gross and microscopic examination of the lungs, livers, and spleens clearly indicates definite retardation of disease in animals treated with 6 mg. of streptomycin per day for 30 days (group III). A similar and quantitatively comparable degree of retardation was achieved by treatment with 2 mg. of streptomycin per day plus usnic acid. On the other hand, there was no evidence that usnic acid alone (group II), in the doses given, affected the course or severity of the disease to any degree. Streptomycin alone in doses of 2 mg. per day (group IV) showed very little retardation of disease. The very definite effect achieved in group V then would seem to indicate a clear potentiating action of usnic acid on streptomycin. Earlier reports of the beneficial action of usnic acid alone were not confirmed in the present series of experiments. Reasons for this are not known although it should be noted that, in the previous experiments, the animals were given a very heavy inoculum intraperitoneally and rapidly developed severe disease. The two experiments are not therefore necessarily comparable.

It has been shown that streptomycin forms a complex with desoxyribonucleic acid (*7*). However, streptomycin does not interfere with the splitting of desoxyribonucleic acid by desoxyribonuclease (*8*). Usnic acid, on the other hand, will inactivate desoxyribonuclease although it does not form a complex with desoxyribonucleic acid (*8*). Thus, both streptomycin and usnic acid may affect the same cellular system (desoxyribonucleic acid-desoxyribonuclease), but in different ways, one acting on the substrate, the other on the enzyme. This observation may account for the synergistic action of the two substances, although the same effect might be obtained if streptomycin and usnic acid each acted on totally different or unrelated systems. We recognize that the system mentioned is not necessarily the one which is significant for the bacteriostatic or bacteriocidal action of either drug, since other systems may be involved.

Although the results obtained show that streptomycin alone in sufficiently large doses is more efficient than usnic acid in arresting tuberculosis in guinea pigs, the observed synergistic action of the two drugs makes it probable that the development of resistance, a serious problem in therapy, may be limited through the combined action of both substances.

The observations presented here may be compared with those obtained with combined streptomycin and PAS therapy (*9, 10, 11, 12, 13, 14, 15*). The net result of treatment with combined streptomycin and PAS appears to be a summation of the effects obtained with each one. Since no demonstrable retardation of the disease was found with usnic acid alone under the conditions of this experiment, the observed action of usnic acid and streptomycin would appear to represent potentiation rather than summation.

Summary

Five groups of guinea pigs which had been inoculated with tubercle bacilli were established as follows: I. Untreated; II. Usnic acid only; III. High doses of streptomycin (6 mg./day); IV. Low doses of streptomycin (2 mg./day); V. Usnic acid plus low doses of streptomycin. Severity of tuberculosis was compared among the various groups. Usnic acid alone did not effect any retardation of the disease nor did low doses of streptomycin (2 mg./day). A comparable, marked retardation in the development of the disease was obtained by each of two modes of treatment: (a) with high doses of streptomycin, and (b) with usnic acid combined with low doses of streptomycin.

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(*14*) Moeschlin, S. and Schreiner, W.: Vergleich der Kombinations therapie von Streptomycin mit Sulfon oder p-Aminosalicylsäure (PAS) bei der experimentellen Tuberkulose. Schweiz. med. Wchnschr. **79:** 117–118 (1949).

(*15*) Bloch, R. G., Vennesland, Kirsten, Ebert, R. H., and Gomori, George: The effect of streptomycin, para-aminosalicylic acid (PAS) and their combination on the tubercle bacillus *in vitro* and *in vivo.* Am. Rev. Tuberc. **59:** 554–561 (1949).

Ex-Tuberculosis Patients Show Good Work Records

According to the Bureau of Labor Statistics of the United States Department of Labor, comparison of the work performance records of ex-tuberculous employees with those of unimpaired industrial employees reveals that former tuberculosis patients have fewer disabling injuries and lose less time because of injuries than unimpaired workers; they are also less likely to quit their jobs. In other respects, there is little difference between the records of the two groups.

This study of 513 ex-tuberculous workers and 910 unimpaired employees forms one chapter of a report to the Veterans Administration.[1] An evaluation is made of the efficiency, output, and general desirability as workers of ex-tuberculous persons employed in the industries studied (which represent all groups in the Bureau's Standard Industrial Classification except lumber and timber basic products). The formerly tuberculous employees are compared with a control group of unimpaired workers selected in such a way that each of the ex-tuberculous persons would be matched with at least one unimpaired worker (preferably with two or three) of closely comparable age and experience and the same sex, working on the same job in the same department with similar incentives and hazards. Findings are tabulated on the basis of the various standard work performance criteria (absenteeism, nondisabling and disabling injury experience, output, and quit rate).

Statistical breakdowns show a greater percentage of the 513 arrested cases in the middle age brackets than the 10,515 otherwise impaired workers forming the rest of the survey group.

Ex-tuberculous patients were widely distributed among the various industry classifications. Their jobs required skills ranging from common labor to highly skilled machinist work. Only about 5 percent, however, were employed on the unskilled jobs. It would appear that job opportunities are greater for those with a skill to sell.

Industrial placement attitudes were found to be generally favorable for former tuberculous patients. Only 7 of the 109 plants studied had exclusion policies affecting such applicants. Reluctance to assign the ex-tuberculous to certain departments in some plants was due to a desire to protect such persons from environmental conditions which might aggravate the impairment; it was not because of a discriminatory employment policy.

It is concluded in the report that the ex-tuberculous employees studied in this survey were "normal workers who, properly placed, were able to compete successfully with unimpaired workers on the same jobs."

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[1] U. S. Department of Labor, Bureau of Labor Statistics: The Performance of Physically Impaired Workers in Manufacturing Industries. Bulletin No. 923. U. S. Government Printing Office, Washington, 1948. 55 cents. Ch. G, pp. 97-103.

Tuberculosis Facilities and Planning Under the Hospital Survey and Construction Act

By Louis S. Reed, Ph. D., and Edward T. Blomquist, M. D.*

With the enactment on August 13, 1946, of the Hospital Survey and Construction Act (Public Law 725, 79th Cong.), Federal aid to the States and Territories became available for surveys of existing hospital and health-center facilities, for development of programs for the construction of needed facilities and for the construction of public and other nonprofit hospitals in accordance with these State plans.

To date all 48 States, the District of Columbia, and the Territories have surveyed their existing facilities and have prepared plans for hospital construction which have been approved by the Surgeon General. Of the total existing hospital beds reported in the latest approved State plans, about 8 percent, or a total of 93,852 beds, are for the care of the tuberculous; 12,393 or 13 percent of these tuberculosis beds have been declared nonacceptable by the State agencies. (See table 1.)

In determining the total number of tuberculosis beds needed, it is specified in the Hospital Survey and Construction Act that Federal funds may not be used to construct facilities for the tuberculous in excess of a ratio of 2.5 beds per average annual death from tuberculosis in the State during the 5-year period 1940–44. (Averages for more recent 5-year periods may be used providing the rate does not exceed that for 1940–44.) On the basis of this prescribed ratio, a total of 146,926 tuberculosis beds is needed—67,477 beds in addition to the present supply. In other words, only 1.4 acceptable beds per average annual death from tuberculosis are now available in the United States and Territories, or just slightly more than half of the total beds estimated to be needed under the ratio set forth in the Act.

Five States and one Territory, Connecticut, Minnesota, Washington, Wisconsin, North Dakota, and Hawaii, report that they have more than 2.5 beds per tuberculosis death, i. e., more beds than the limit set for Federal aid. Another State, Colorado, has more than 2.5 beds per average annual death but approximately two-thirds of its beds are for the use of out-of-state residents, and additional beds are required for use of State residents. The Virgin Islands reported no acceptable tuberculosis beds, and 9 additional States and Territories have less than one bed per average annual death from tuberculosis, or less than two-fifths of the total tuberculosis beds needed. The following is a

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*Chief, Division of Medical and Hospital Resources; and Senior Surgeon, Assistant Chief, Division of Tuberculosis, respectively, Public Health Service.

Table 1. *Tuberculosis beds:*[1] *total existing beds, additional needs and beds being constructed through approved projects Title VI, Public Health Service Act*[2]

	Existing beds			Additional beds needed	Beds being constructed in approved tuberculosis projects
	Total	Acceptable	Nonacceptable[3]		
United States and Territories	93, 852	81, 459	12, 393	67, 477	3, 091
United States	89, 392	77, 136	12, 256	58, 867	2, 075
Alabama	724	519	205	2, 939	54
Arizona	526	526	----------	1, 026	----------
Arkansas	1, 351	1, 351	----------	979	----------
California	7, 752	5, 353	2, 399	3, 980	----------
Colorado	1, 270	1, 050	220	654	----------
Connecticut	1, 721	1, 721	----------	----------	----------
Delaware	193	193	----------	89	----------
Dist. of Columbia	1, 177	1, 052	125	439	----------
Florida	1, 540	893	647	1, 287	400
Georgia	1, 460	1, 460	----------	1, 360	----------
Idaho	70	70	----------	98	----------
Illinois	5, 044	5, 044	----------	2, 167	100
Indiana	1, 771	1, 237	534	1, 583	----------
Iowa	777	639	138	341	----------
Kansas	448	448	----------	562	----------
Kentucky	1, 640	1, 614	26	2, 401	64
Louisiana	1, 286	1, 254	32	2, 021	100
Maine	526	526	----------	211	----------
Maryland	1, 969	1, 829	140	1, 206	294
Massachusetts	3, 695	3, 688	7	287	----------
Michigan	4, 676	3, 659	1, 017	617	100
Minnesota	1, 995	1, 930	65	----------	----------
Mississippi	676	611	65	1, 822	154
Missouri	1, 805	1, 805	----------	2, 282	----------
Montana	235	235	----------	262	----------
Nebraska	200	200	----------	303	----------
Nevada	21	21	----------	152	----------
New Hampshire	189	189	----------	121	----------
New Jersey	3, 290	3, 211	79	461	----------
New Mexico	353	353	----------	584	----------
New York	12, 256	9, 540	2, 716	4, 923	----------
North Carolina	2, 014	1, 830	184	1, 660	----------
North Dakota	275	275	----------	----------	----------
Ohio	3, 825	3, 332	493	3, 771	174
Oklahoma	1, 264	1, 264	----------	1, 227	30
Oregon	577	495	82	198	----------
Pennsylvania	5, 671	3, 772	1, 899	4, 948	----------
Rhode Island	629	629	----------	84	----------
South Carolina	990	794	196	776	194
South Dakota	192	192	----------	261	----------
Tennessee	1, 862	1, 862	----------	2, 538	300
Texas	3, 434	3, 413	21	5, 287	111
Utah	96	96	----------	69	----------
Vermont	112	112	----------	188	----------
Virginia	1, 892	1, 601	291	1, 524	----------
Washington	2, 394	2, 126	268	177	----------
West Virginia	1, 321	1, 021	300	974	----------
Wisconsin	2, 126	2, 019	107	----------	----------
Wyoming	82	82	----------	28	----------
Alaska	169	169	----------	826	----------
Hawaii	1, 252	1, 137	115	----------	[4] 216
Puerto Rico	3, 017	3, 017	----------	7, 739	800
Virgin Islands	22	----------	22	45	----------

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[1] Includes beds in hospitals for the diagnosis and treatment of tuberculosis, excluding preventoria.

[2] Existing beds and additional needs are based on data reported in latest approved State plans for hospital construction, as of Nov. 30, 1949; data on beds being constructed through approved project applications are as of Oct. 31, 1949. In accordance with the Act, the total number of beds for tuberculosis patients shall not exceed 2.5 times the average annual deaths from tuberculosis in the State over the 5-year period 1940–44, average for other 5-year periods may be used provided the rate does not exceed that for the 1940–44 period.

[3] Represents beds classified as "nonacceptable" by the State agencies on the basis of fire hazards, obsolete construction, health hazards, etc.

[4] This project was initially approved June 10, 1948, when the bed per death ratio was below 2.5.

distribution of the 53 States and Territories by the number of existing acceptable beds per average annual death from tuberculosis:

Number of beds per average annual death from tuberculosis	*Number of States and Territories*
0	1
0.01–0.49	2
0.50–0.99	8
1.00–1.49	21
1.50–1.99	11
2.00–2.49	3
2.50 and over	7
	53

Thus far, construction of tuberculosis facilities under the program has not kept pace with the construction of general and specialized hospital beds. Whereas the need for additional general and specialized hospital beds is only four times that for additional tuberculosis beds (see table 2), approved projects for new construction in general and specialized hospitals contain about 12 times as many beds as do approved projects for tuberculosis hospitals. Moreover, only 27, or 3.2 percent of the 836 approved project applications for all types of hospitals have been for tuberculosis projects. In other words, approved construction projects for tuberculosis hospital beds are meeting requirements at a much slower rate than are projects for general hospitals.

If we compare the current supply of acceptable beds with total requirements (chart), it becomes apparent that there is a slightly greater proportionate need for additional tuberculosis hospital construction at this time than for general and specialized beds (46 percent against 36 percent, respectively). Assuming that construction funds should be used for specific facilities in proportion to the relative need for those facilities, it is apparent that the amounts of Federal funds used by the States for tuberculosis hospitals were disproportionately

Table 2. *Tuberculosis, general, and special*[1] *hospital facilities: comparison of beds available, beds needed, and new construction under the Hospital Survey and Construction Act, United States and Territories as of Oct. 31, 1949*

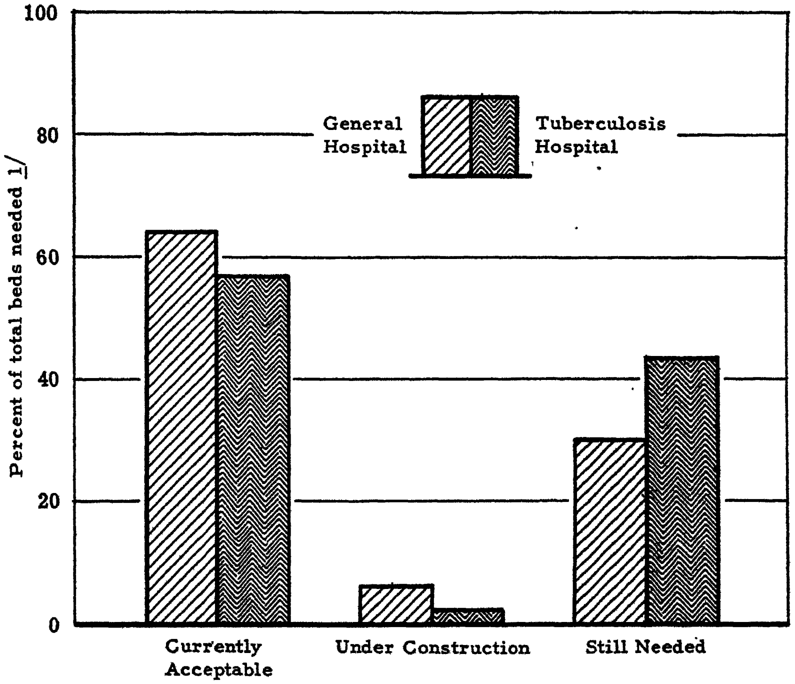
	Number of beds		Percent of total beds needed	
	General and special hospitals	Tuberculosis hospitals	General and special hospitals	Tuberculosis hospitals
Total bed requirements[2]	680,884	146,926	100	100
Existing acceptable beds	434,882	81,459	64	55
Additional beds needed	246,002	67,477	36	46
Beds approved for construction[3]	37,687	3,091	6	2

[1] General and special hospital facilities include hospitals planned for the care and treatment of acute conditions and specialized types of cases other than mental and tuberculosis, and chronic disease.

[2] Total beds needed to provide adequate hospital facilities is defined in the act as 4.5 to 5.5 beds per 1,000 population (depending on population density) for general hospital beds and not more than 2.5 beds per average annual death from tuberculosis for tuberculosis hospital beds.

[3] 15 percent of the additional beds needed for general hospitals and only 4 percent of the additional beds needed for tuberculosis hospitals have been approved for construction.

PROGRESS IN MEETING THE NEED FOR ADDITIONAL BEDS UNDER THE HOSPITAL SURVEY AND CONSTRUCTION ACT
(General Hospitals Compared with Tuberculosis Hospitals)



1/ Under the Hospital Survey and Construction Act total beds needed for tuberculosis is defined as not more than 2½ beds per average annual tuberculosis death in the period 1940-1944, and for general hospital beds as not more than 4½ beds per 1000 population.

low, since only $8,883,765 were used for tuberculosis hospitals, as compared with $160,079,404 for general hospital projects (as of October 31, 1949).

On October 25, 1949, several amendments to the Act were passed which vastly liberalize the original provisions. These amendments, which are contained in Public Law 380, incorporate the following:

1. The duration of the program is extended for an additional 4 years, i. e., from 1951 to 1955.

2. The annual Federal allotments to the States are increased from $75,000,000 to $150,000,000. In general, each State's allotment will be doubled.

3. Formerly the Federal Government would bear one-third of the cost of construction of aided projects. Now each State will have considerable discretion in determining the proportion of the cost of hospital and health center projects to be met from Federal funds. The State has two basic alternatives: the State may determine that the

Federal share shall be a uniform percentage for all projects within the State. In this case, it may set the Federal share at a figure between a floor of 33⅓ percent and a ceiling which varies from State to State, being 33⅓ percent in the States with the highest per capita income, and 66⅔ percent in the States with the lowest per capita income. For example, this ceiling for Minnesota is 56 percent. Minnesota could set the Federal share at any figure between 33⅓ and 56 percent.

Or the State may decide to vary the Federal share among projects or classes of projects in accordance with the economic resources of local areas or other equitable factors. If it decides to do this it may vary the Federal share within a range of 33⅓ percent to 66⅔ percent, i. e., it could decide that Federal funds would pay one-third of the cost of a hospital in a wealthy area, and as high as two-thirds in a poor area.

4. Special aid is provided in so called hardship cases, i. e., hospitals that were started without Federal aid, and cannot be completed with out such aid.

5. Annual appropriations of up to $1,200,000 are authorized for grants for research and demonstration projects relating to the development, utilization, and coordination of hospital services, facilities, and resources. Such grants may be made to public or nonprofit organizations. The principal objective of this provision is to stimulate coordination of hospital services on a regional basis.

As has been demonstated, there has been very little new construction of tuberculosis beds under the Act.

There is, it is true, some construction of beds for the tuberculous outside the Hospital Survey and Construction Act. Nevertheless, the need for such facilities remains acute in virtually every State of the Nation. Today, only six States and one Territory meet the recommended ratio of 2½ tuberculosis beds per average annual death from the disease.

In many communities, tuberculosis control workers are daily confronted by the problem of long waiting lists for admission to tuberculosis hospitals. Despite the obvious public health hazards, patients are frequently and of necessity permitted to remain in contact with members of their families and their communities, and necessary treatment is indefinitely postponed.

At times this intolerable situation has forced the adoption of unrealistic admission and discharge policies, to the general detriment of the public health program. In some areas, policies limiting admissions to sputum-positive or far advanced cases, for example, have grown to be matters of very real concern to local tuberculosis control workers. In others, regulations restricting a patient's hospital residence to a certain period of time—usually far less than necessary—contain grave implications for the future control of the disease wherever they are invoked.

Public health officers, public health nurses, and all other professional workers concerned with tuberculosis control in local areas repeatedly emphasize the hardships resulting from the extreme shortage of tuberculosis hospitalization facilities. Today case finding, although valuable because it identifies cases and puts them under medical supervision, does not achieve maximum benefits when those who need hospitalization cannot receive it.

At this time, any attempt to analyze the reasons for the relative lack of activity in tuberculosis hospital construction would be based on conjecture. Until now, the emphasis has been upon the construction of general hospitals, and the highest priorities have been given, and are still going to this type of construction.

To be sure, the need for general hospital beds, by sheer weight of numbers, is indeed great, so that the emphasis has not been misdirected. However, it is possible that this very emphasis has generated a misapprehension among tuberculosis control officials that the porvisions of the Act do not apply to tuberculosis. Such is not at all the case, nor was it ever so intended.

The Act applies with equal force to the construction of tuberculosis facilities where the need can be demonstrated, and, as is evident from the earlier sections of this paper, the need can indeed be demonstrated in most areas of the country.

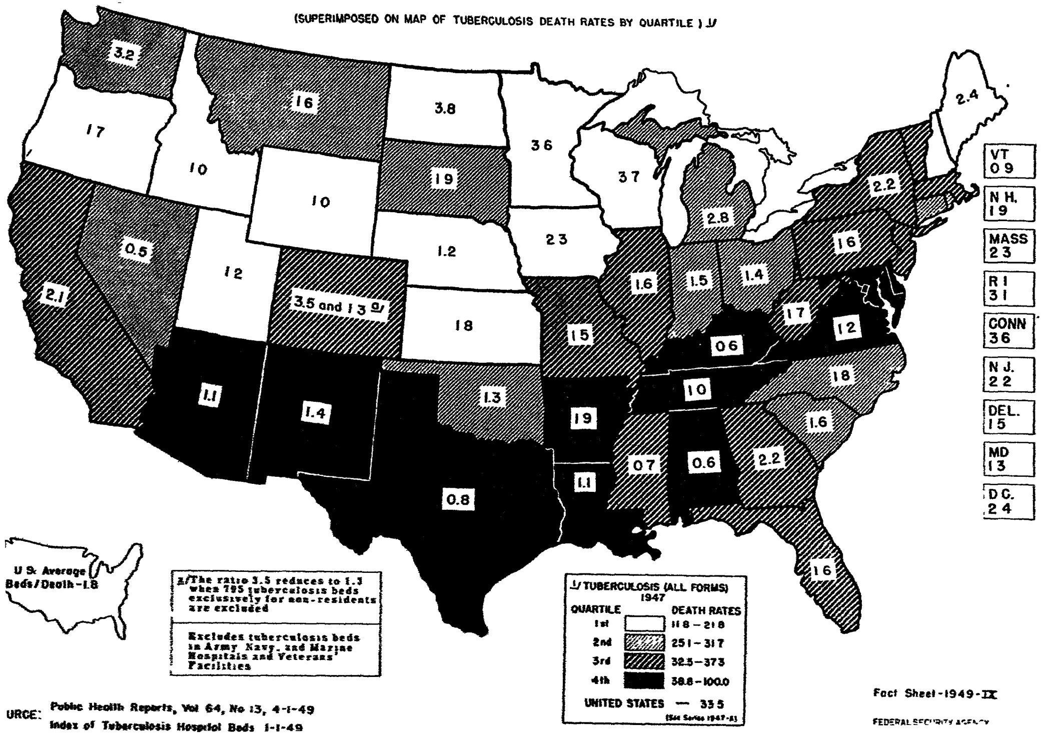
The Act, as now amended, provides an excellent opportunity for material advances in tuberculosis control everywhere. Liberal financial assistance is now available to the States in meeting the most costly phase of tuberculosis control—that of hospital care for all requiring it. Public health workers should therefore take every opportunity to make local tuberculosis hospitalization needs known to State hospital planning boards and to the members of their communities from whom major support must ultimately derive.

Finally, serious consideration should be given to integrating plans for tuberculosis bed construction with those of general hospitals. Past experience has shown this to be a highly desirable practice, and several States, including New Hampshire, California, Colorado, and Kentucky, have already incorporated it in their plans for future hospital construction. In some areas, in fact, this trend toward the incorporation of tuberculosis treatment units within general hospitals has become quite marked. This is especially true of rural areas seeking a practical answer to the problem of inadequate tuberculosis hospital care facilities.

The means and the techniques for reducing the shortage of tuberculosis hospital beds are now more readily available than ever before. Aggressive action on the part of local public health officials and tuberculosis control workers is what is now needed to bring the nationwide program of effective tuberculosis hospitalization to fruition.

TUBERCULOSIS BEDS PER DEATH, UNITED STATES RATIO OF BEDS (JAN. 1, 1949) TO DEATHS (1947)

(SUPERIMPOSED ON MAP OF TUBERCULOSIS DEATH RATES BY QUARTILE)1/



2/ The ratio 3.5 reduces to 1.3 when 795 tuberculosis beds exclusively for non-residents are excluded

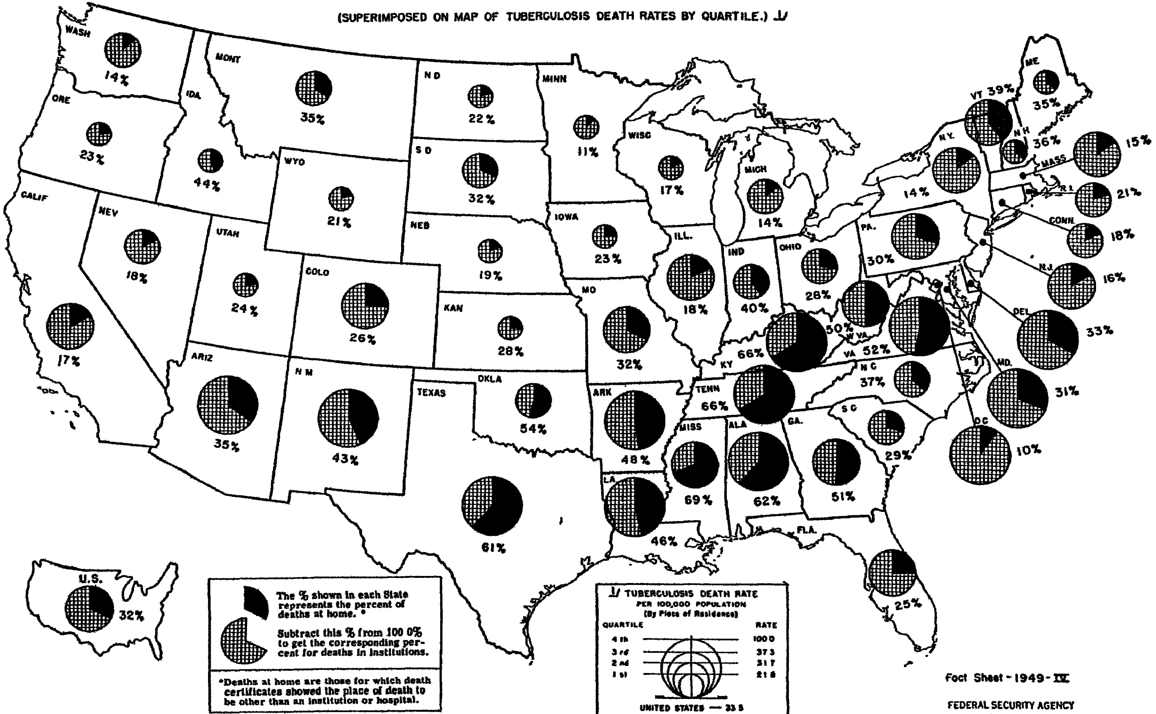
Excludes tuberculosis beds in Army, Navy, and Marine Hospitals and Veterans' Facilities

URCE: Public Health Reports, Vol 64, No 13, 4-1-49
Index of Tuberculosis Hospital Beds 1-1-49

Fact Sheet - 1949 - IX
FEDERAL SECURITY AGENCY

RESPIRATORY TUBERCULOSIS DEATHS AT HOME ◗ AND IN INSTITUTIONS ◔ FOR EACH STATE AND THE UNITED STATES, 1947

(SUPERIMPOSED ON MAP OF TUBERCULOSIS DEATH RATES BY QUARTILE.) 1/



◗ The % shown in each State represents the percent of deaths at home.*

◔ Subtract this % from 100.0% to get the corresponding percent for deaths in institutions.

*Deaths at home are those for which death certificates showed the place of death to be other than an institution or hospital.

1/ TUBERCULOSIS DEATH RATE PER 100,000 POPULATION (By Place of Residence)

QUARTILE	RATE
4th	100.0
3rd	37.3
2nd	31.7
1st	21.8

UNITED STATES — 33.3
1947

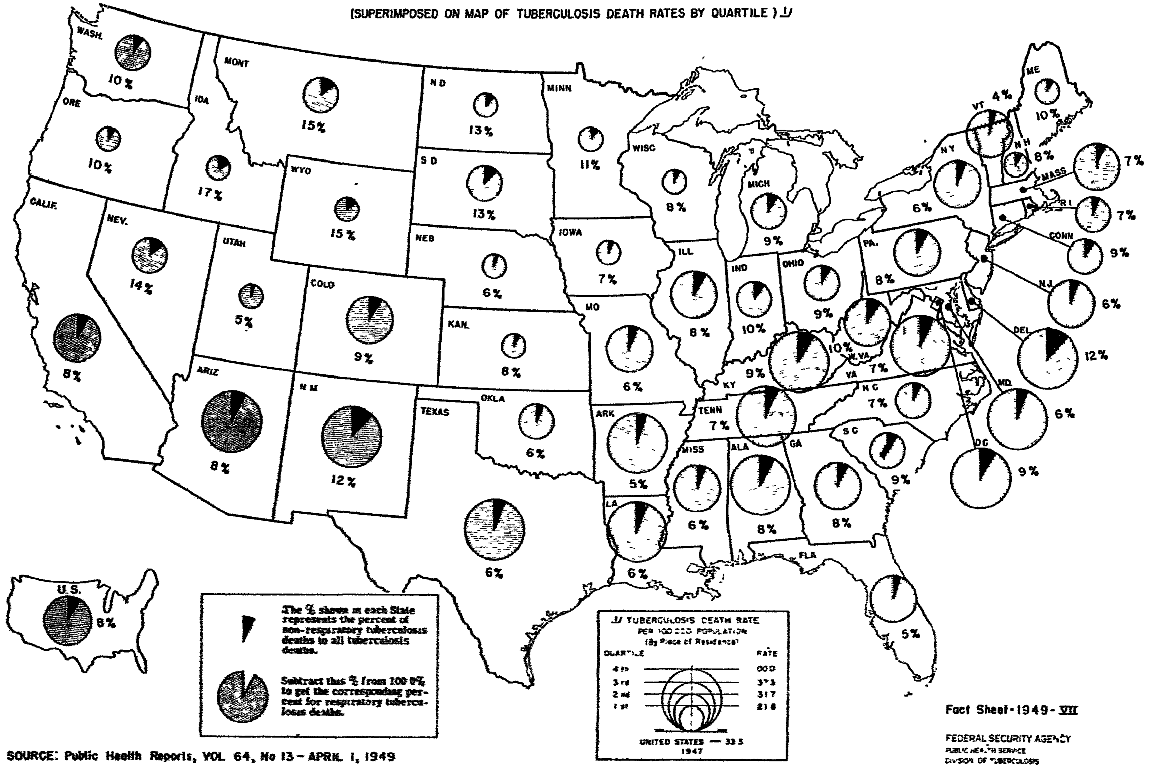
Fact Sheet - 1949 - IV

FEDERAL SECURITY AGENCY
PUBLIC HEALTH SERVICE
DIVISION OF TUBERCULOSIS

SOURCE: Public Health Reports, Vol. 64, No 13, April 1, 1949

RESPIRATORY ▨ AND NON-RESPIRATORY ▼ TUBERCULOSIS DEATHS AS A PERCENT OF ALL TUBERCULOSIS DEATHS FOR EACH STATE AND FOR THE UNITED STATES, 1947

(SUPERIMPOSED ON MAP OF TUBERCULOSIS DEATH RATES BY QUARTILE)[1]



SOURCE: Public Health Reports, VOL 64, No 13 – APRIL 1, 1949

Fact Sheet-1949-VII

FEDERAL SECURITY AGENCY
PUBLIC HEALTH SERVICE
DIVISION OF TUBERCULOSIS

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JANUARY 14, 1950

For the current week, increases in reported cases of measles (from 3,044 to 4,946), whooping cough (from 1,660 to 2,159), influenza (from 4,077 to 4,325), and scarlet fever (from 1,232 to 1,425) were shown over the preceding week. Additional diseases showing increases for the current period are diphtheria, meningococcal meningitis, all forms of pneumonia, Rocky Mountain spotted fever, tularemia, and typhoid and paratyphoid fever.

Although reported incidence of measles increased sharply for the week, the total remained below the 5-year (1945–49) median for the corresponding week. The current cumulative totals for the calendar and seasonal years are also below the corresponding medians for the same periods. Michigan reported the largest numerical increase in measles, from 167 to 1,336, for the current week. The 5-year (1945–49) median for the week is 310. Other States showing increases in reported cases of measles are California (from 13 to 187), New Jersey (from 398 to 528), Wisconsin (from 99 to 233), and New Mexico (from 4 to 102).

Reported cases of influenza increased chiefly in Texas (from 2,432 to 2,667), Georgia (from 202 to 314), Oklahoma (from 90 to 163), and Nebraska (from 11 to 42). Virginia reported a decrease of 124 cases of influenza for the week, from 513 to 389.

Michigan reported the largest increase (from 42 to 148) in cases of scarlet fever for the week. The 5-year (1945–49) median for the week for Michigan is 136.

Reported incidence of other diseases increased as shown in the following table:

	Current week	*Last week*	*1945–49 median*
Diphtheria	205	166	340
Meningitis, meningococcal	94	73	100
Pneumonia	2, 262	2, 210	-------
Rocky Mountain spotted fever	3	1	0
Tularemia	23	21	43
Typhoid and paratyphoid	38	24	41
Whooping cough	2, 159	1, 660	2, 263

One case of anthrax was reported in Arkansas, and one case of smallpox was reported in Kentucky.

Telegraphic case reports from State health officers for week ended January 14, 1950

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	---	---	---	43	---	16	1	---	16	---	---	2	16	---
New Hampshire	---	---	---	---	---	1	---	---	1	---	---	---	---	---
Vermont	---	---	---	1	---	---	---	---	9	---	---	---	26	---
Massachusetts	---	---	---	26	1	---	1	---	86	---	---	---	107	---
Rhode Island	1	---	1	2	---	---	2	---	12	---	---	---	4	---
Connecticut	1	---	---	24	---	51	1	---	21	---	---	---	105	---
MIDDLE ATLANTIC														
New York	15	---	[1] 1	258	5	268	9	---	[2] 82	---	---	---	254	12
New Jersey	---	1	4	528	4	141	6	1	34	---	---	---	182	1
Pennsylvania	2	---	---	96	7	110	5	---	83	---	1	1	176	1
EAST NORTH CENTRAL														
Ohio	14	---	---	94	5	84	2	1	182	---	1	1	134	9
Indiana	4	---	5	28	2	22	2	---	53	---	---	1	18	[3] 15
Illinois	3	2	3	99	4	62	4	---	45	---	8	1	67	2
Michigan	7	3	---	1,336	5	56	4	---	148	---	---	---	241	1
Wisconsin	---	---	14	233	2	17	---	---	60	---	---	---	122	---
WEST NORTH CENTRAL														
Minnesota	10	---	---	82	3	5	3	---	15	---	---	---	21	---
Iowa	---	---	---	162	2	3	6	---	8	---	---	---	13	3
Missouri	2	---	---	4	---	8	2	---	12	---	2	1	16	---
North Dakota	---	---	---	4	---	---	---	---	---	---	---	---	1	---
South Dakota	2	---	---	6	---	1	---	---	3	---	---	---	1	---
Nebraska	1	---	42	194	---	3	1	---	17	---	---	---	4	---
Kansas	2	2	1	5	---	7	---	---	20	---	---	---	8	1
SOUTH ATLANTIC														
Delaware	1	---	---	24	---	---	---	---	4	---	---	---	2	---
Maryland	3	1	2	50	2	63	1	---	15	---	---	3	74	---
District of Columbia	---	---	---	35	---	13	---	---	3	---	---	---	---	---
Virginia	8	---	389	35	3	96	4	---	35	---	5	3	16	1
West Virginia	---	---	49	91	3	29	2	---	13	---	---	---	60	4
North Carolina	10	---	---	169	2	---	2	---	61	---	1	---	34	---
South Carolina	3	---	19	147	---	26	---	---	6	---	---	1	---	13
Georgia	9	---	314	16	1	22	1	---	19	---	1	3	8	16
Florida	4	---	11	24	6	26	4	---	4	---	---	2	2	2

EAST SOUTH CENTRAL														
Kentucky	5	-------	-------	36	8	33	1	-------	37	1	-------	3	16	8
Tennessee	8	-------	63	119	4	88	1	-------	56	-------	4	1	63	7
Alabama	5	-------	178	26	1	80	1	-------	32	-------	-------	1	5	8
Mississippi	10	-------	21	39	3	37	2	-------	9	-------	-------	2	4	1
WEST SOUTH CENTRAL														
Arkansas	3	-------	124	6	-------	72	-------	1	3	-------	-------	-------	5	3
Louisiana	2	-------	-------	25	2	52	-------	-------	1	-------	2	4	2	1
Oklahoma	4	-------	163	6	2	49	2	-------	8	-------	-------	2	13	2
Texas	40	-------	2,667	63	5	532	16	-------	34	-------	1	1	84	17
MOUNTAIN														
Montana	-------	-------	20	120	-------	-------	-------	-------	10	-------	-------	1	4	-------
Idaho	1	-------	8	3	1	20	5	-------	5	-------	-------	-------	1	-------
Wyoming	1	-------	-------	5	1	1	-------	-------	3	-------	-------	-------	1	-------
Colorado	2	-------	11	80	-------	32	2	-------	16	-------	-------	-------	14	-------
New Mexico	-------	-------	3	102	-------	12	-------	-------	6	-------	1	1	8	-------
Arizona	5	-------	188	90	-------	30	2	-------	7	-------	-------	-------	49	-------
Utah	2	-------	1	119	-------	3	4	-------	1	-------	-------	-------	10	-------
Nevada	1	-------	-------	-------	-------	8	-------	-------	-------	-------	-------	-------	-------	-------
PACIFIC														
Washington	2	-------	-------	61	1	3	2	-------	37	-------	-------	-------	32	-------
Oregon	1	-------	11	43	2	32	5	-------	14	-------	-------	-------	18	-------
California	11	-------	12	187	7	48	17	-------	79	-------	-------	3	118	-------
Total	205	9	4,325	4,946	94	2,262	123	3	1,425	1	27	38	2,159	128
Median, 1945-49	340	8	4,728	5,314	100	-------	54	-------	2,467	5	43	41	2,263	-------
Year to date 2 weeks	371	22	8,402	7,990	167	4,472	247	4	2,657	2	48	62	3,819	248
Median, 1945-59	706	13	8,719	8,083	183	-------	111	1	4,474	8	82	81	4,097	-------
Seasonal low week ends	(27th) July 9		(30th) July 30	(35th) Sept. 3	(37th) Sept. 17		(11th) Mar. 19		(32d) Aug. 13	(35th) Sept. 3		(11th) Mar. 19	(39th) Oct. 1	
Since seasonal low week	4,642	-------	39,932	27,120	1,080	-------	41,707	-------	19,096	9	-------	2,499	25,355	-------
Median, 1944-45 to 1948-49	8,272	-------	44,492	34,207	1,155	-------	19,093	-------	31,102	62	-------	3,609	28,434	-------

---

[1] New York City only.

[2] Including streptococcal sore throat.

[3] Two weeks report.

Anthrax: Arkansas, 1 case.

Alaska: Pneumonia 1.

Hawaii: Influenza 783, measles 1, meningitis meningococcal 1.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (rodent).—Under date of January 11, 1950, plague infection was reported proved in one rat found dead on December 13, 1949, in Kapulena Area, Hamakua District, Island of Hawaii, T. H.

Panama Canal Zone

Notifiable diseases—November 1949.—During the month of November 1949, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence[1]									
	Panama City		Colon		Canal Zone		Outside the zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	2		7		7				16	
Diphtheria	2		1				2		5	
Dysentery:										
Amebic	1		2		1		3		7	
Bacillary	2						1		3	
Hepatitis, infectious	1				1				2	
Malaria[2]	2				5		29		36	
Measles					8				8	
Mumps	2				20				22	
Pneumonia		3		2	34	4		6	[3] 34	15
Tetanus	1								1	
Tuberculosis		23		6	1			10	[3] 1	39
Typhoid fever			1				2		3	
Whooping cough				1	6			1	[3] 6	2
Yaws	1						1		2	

[1] If place of infection is known, cases are so listed instead of by residence.
[2] Two recurrent cases.
[3] Reported in the Canal Zone only.

Puerto Rico

Notifiable diseases.—4 weeks ended November 26, 1949, and 5 weeks ended December 31, 1949.—During the 4 weeks ended November 26, 1949, and 5 weeks ended December 31, 1949, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases		Disease	Cases	
	4 weeks ended Nov. 26, 1949	5 weeks ended Dec. 31, 1949		4 weeks ended Nov. 26, 1949	5 weeks ended Dec. 31, 1949
Chickenpox	8	4	Syphilis	23	44
Diphtheria	37	46	Tetanus	6	12
Dysentery	1		Tetanus, infantile	2	3
Gonorrhea	62	130	Tuberculosis (all forms)	495	938
Influenza	1,404	369	Typhoid fever	3	2
Malaria	11	10	Typhus fever (murine)	1	
Measles		2	Whooping cough	255	191
Poliomyelitis	5	2			

FOREIGN REPORTS

CANADA

Provinces.—Notifiable diseases—Week ended December 24, 1949.—During the week ended December 24, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	1	------	8	------	254	335	35	53	75	51	812
Diphtheria	------	------	------	------	7	5	------	------	------	------	12
Dysentery:											
Amebic	------	------	------	------	------	------	------	1	------	------	1
Bacillary	------	------	------	------	------	------	2	------	------	1	3
Encephalitis, infectious	------	------	------	------	------	1	1	------	------	------	2
German measles	------	------	1	------	2	37	2	10	92	32	176
Influenza	------	------	6	------	------	------	1	------	------	------	7
Measles	------	------	2	------	179	87	26	83	90	290	757
Meningitis, meningococcal	------	------	------	------	1	------	------	------	------	------	1
Mumps	------	------	35	------	134	269	2	8	51	92	591
Poliomyelitis	------	------	------	------	------	1	------	------	------	------	1
Scarlet fever	9	------	------	1	43	39	5	1	50	8	156
Tuberculosis (all forms)	9	------	17	2	122	22	10	12	29	26	249
Typhoid and paratyphoid fever	------	------	------	------	7	1	------	------	------	------	8
Undulant fever	------	------	------	------	1	1	------	2	------	2	6
Venereal diseases:											
Gonorrhea	5	------	6	8	74	57	21	14	24	89	298
Syphilis	------	------	4	4	45	15	6	25	1	18	118
Other forms	------	------	------	------	------	------	------	------	------	1	1
Whooping cough	------	------	2	------	170	32	------	------	------	4	208

CUBA

Habana—Notifiable diseases—4 weeks ended November 26, 1949.—During the 4 weeks ended November 26, 1949, certain notifiable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	21	2	Rickettsiosis	1	------
Leptospirosis	1	------	Tuberculosis	2	1
Malaria	1	------	Typhoid fever	1	------
Measles	3	------			

Provinces—Notifiable diseases.—4 weeks ended November 26, 1949—During the 4 weeks ended November 26, 1949, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

CUBA—Continued

Disease	Pinar del Rio	Habana[1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	8	9	12	22	1	16	68
Chickenpox						1	1
Diphtheria	4	26	6	1			37
Leprosy		3				1	4
Leptospirosis		1					1
Malaria	1	1		1	2	22	27
Measles		3			1		4
Poliomyelitis					1		1
Rickettsiosis		1					1
Tuberculosis		12	10	26	10	10	68
Typhoid fever	9	6	4	1	1	34	55
Undulant fever				1			1
Yaws						5	5

[1] Includes the city of Habana.

Ethiopia

Malaria.—Information dated January 7, 1950, states that a serious epidemic of pernicious malaria has been reported near Dessie in Wollo Province, Ethiopia. It is said that 582 deaths from this disease occurred in the small town of Komblochia during the months of September and October 1949, and an estimated number of 500–600 deaths were reported in adjacent areas during the same period.

Madagascar

Notifiable diseases—November 1949.—Notifiable diseases were reported in Madagascar and Comoro Islands during November 1949, as follows:

Disease	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Beriberi			2	
Bilharziasis			53	
Cerebrospinal meningitis			12	4
Diphtheria			1	1
Dysentery, amebic	10		406	8
Erysipelas			17	
Influenza	93		4,841	43
Leprosy			40	
Malaria	347		33,067	224
Measles	1		322	7
Mumps	3		290	
Plague			13	11
Pneumonia, broncho	3		455	57
Pneumonia, pneumococcic	4		368	46
Puerperal infection			1	
Relapsing fever	2		1	
Tuberculosis, pulmonary	3		90	15
Typhoid fever	2	1	12	1
Whooping cough	4		392	19

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Plague

India—Central Province.—During the week ended December 3, 1949, 777 cases of plague, with 99 deaths, were reported in Central Province, India.

Netherlands Indies—Java—Jogjakarta.—For the week ended January 7, 1950, 17 fatal cases of plague were reported in Jogjakarta City, Java.

Siam (Thailand).—During the week ended December 24, 1949, 4 cases of plague (2 fatal) were reported in Siam—2 cases, 1 death, in Phitsnulok Province, 2 cases, 1 death, in Ubonratchthani Province.

Smallpox

Arabia—Jedda and Mecca.—During the week ended December 31, 1949, 96 cases of smallpox were reported in Jedda, Arabia, and 19 cases in Mecca.

Burma—Bassein and Rangoon.—During the month of December 1949, 143 cases of smallpox were reported in Bassein and 85 cases in Rangoon, Burma. For the week ended January 7, 1950, 26 cases were reported in Bassein, and 42 cases in Rangoon.

Indochina (French)—Tonkin.—During the week ended December 31, 1949, 109 cases of smallpox were reported in Laokay Province, Tonkin State, French Indochina.

Mexico.—During the period January 1–June 30, 1949, 677 cases of smallpox, with 226 deaths, were reported in Mexico. For the same period in 1948, 1,029 cases, with 623 deaths, were reported in that country.

Niger Territory.—For the period December 11–20, 1949, 80 cases of smallpox were reported in Niger Territory, French West Africa.

Pakistan—Chittagong.—For the week ended January 7, 1950, 18 cases of smallpox were reported in Chittagong, Pakistan.

Syria—Tartus.—During the week ended December 17, 1949, 4 cases of smallpox were reported in the port of Tartus, Syria.

Typhus Fever

British East Africa—Tanganyika—Dar-es-Salaam.—During the week ended December 10, 1949, 1 case of typhus fever was reported in Dar-es-Salaam, Tanganyika Territory, British East Africa.

China.—Typhus fever has been reported in cities in China as follows: November 21–30, 1949, Canton 1 case; December 1–10, 1949, Tientsin 1 case; week ended December 31, 1949, Shanghai, 1 case.

Pakistan—North West Frontier Province.—During the week ended December 31, 1949, 25 cases of typhus fever, with 11 deaths, were reported in North West Frontier Province, Pakistan.

DEATHS DURING WEEK ENDED JAN. 14, 1950

	Week ended Jan. 14, 1950	Corresponding week, 1949
Data for 94 large cities of the United States:		
Total deaths	9, 906	9, 896
Median for 3 prior years	10, 013	
Total deaths, first 2 weeks of year	19, 619	20, 686
Deaths under 1 year of age	605	716
Median for 3 prior years	716	
Deaths under 1 year of age, first 2 weeks of year	1, 254	1, 425
Data from industrial insurance companies:		
Policies in force	64, 757, 993	65, 790, 577
Number of death claims	12, 525	12, 566
Death claims per 1,000 policies in force, annual rate	10. 1	10. 0
Death claims per 1,000 policies, first 2 weeks of year, annual rate	9. 5	9. 7

* * *

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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Estimates of Disabling Illness Prevalence in the United States

Based on the February 1949 Current Population Survey

By Theodore D. Woolsey*

Several questions relating to disabling illness among persons from 14 to 64 years of age were added to the schedule of the Census Bureau's Current Population Survey in February 1949. These questions were designed to get an estimate of the number of persons between those ages in the civilian noninstitutional population who, on the day of enumeration, were unable to do their regular work or other duties because of illness or a disabling condition [1] or who had a long-term physical or mental condition that allowed them to work only occasionally or not at all.

It had been 13 years since statistics on the prevalence of disabling illness had been obtained for a large sample of the urban population in the National Health Survey (*1*). And it had been 6 years since the Social Security Board had used the Census Bureau sample to obtain the number of persons "unable to engage in ordinary activities for 1 day or more last week because of illness, injury, or physical or mental disability" (*2*).

Very few surveys in the United States have been of national scope or specifically planned to provide estimates of the amount of disabling illness prevailing in the country on the particular day of the canvass. Such surveys must almost of necessity be extensive rather than intensive, that is, they must sacrifice detailed questions and elaborate integration of interview results with data from other local sources, such as physicians, hospitals, and clinics, in order to gain the widespread coverage needed in a sample designed to be representative of the entire country.[2] Hence, for a more complete as well as a more accurate knowledge of the amount and distribution of illness in the general population, both extensive and intensive surveys are required. The information from each type is essential to a proper understanding of the other.

---

*Biostatistician, Division of Public Health Methods, Public Health Service. This survey was undertaken as a joint project of the Bureau of Old-Age and Survivors Insurance, Social Security Administration; the Office of Vocational Rehabilitation, Office of Special Services; and the Division of Public Health Methods, Public Health Service. Field collection, processing of schedules, tabulating, and computation of sampling error were done by the Bureau of the Census.

[1] "Disabling condition," as used here and elsewhere in this report, is distinguished from disabling illness only in that the former prevents the person from working or carrying on his or her usual activities without currently causing illness in the ordinary sense.

The February 1949 survey was definitely not intensive. Owing to the unavoidable limitations in the number of questions that can be added to the Census Bureau schedule for any one monthly survey, it was impossible to obtain any break-down of the total amount of disabling illness by type. On the other hand, it was the first survey since the National Health Survey of 1935–36 and the Social Security Board survey of 1943 that could provide national estimates of the prevalence of disabling illness by age, race, and sex. As such it was exceedingly useful in bringing our knowledge of these important figures up-to-date. Some limited comparisons between this survey and the National Health Survey will be found in the appendix.

The Schedule

The schedule to which questions were added in February is that used by the Census Bureau each month to collect statistics on the size and composition of the labor force. For this reason in its usual form it applies only to persons in the population who are 14 years of age or over.[3] The concept of disability is somewhat less objective for children and for persons 65 years of age and over. Hence, the questions on disabling illness were limited to persons from 14 to 64 years, inclusive. Personal details on these individuals were already available on the schedule, including age, sex, race, veteran status (World War II only), and occupation. For the purposes of the survey of disabling illness, marital status of women was added to the items collected for tabulation. Of course, the employment status of each individual was also available because of the questions that form the main body of the schedule. Furthermore, there is each month a question designed to ascertain the number of persons who are "unable to work," that is, who should not be considered a part of the labor force [4] owing to a "long-term physical or mental illness or disability" which prevents them from doing any kind of work and which is expected to continue to prevent them from working for at least 6 months.

---

[2] The National Health Survey might be considered an exception to this generalization. The schedule was quite detailed and a large subsample of the diagnoses was checked back with the physician in attendance, and yet it was certainly extensive in its scope, being deficient only in its coverage of rural areas.

[3] The survey is also used at times to determine other characteristics of the population such as educational attainment, housing, income, migration, and so forth.

[4] The civilian labor force is defined to include all persons 14 years of age and over who, in the week prior to the interview, were (*a*) working, (*b*) not working but looking for work, or (*c*) not working or looking for work but with a job or business from which they were absent all week.

All the regular questions on the schedule relate to the last calendar week prior to the interview while the disability questions referred to the actual day of interview.

The interviewers were instructed to ask the first two supplementary questions on disabling illness in exactly the following words: "This month we are making a study of illness and disability. First of all I'd like to check the persons who aren't able to do their regular work or other duties today because of illness or disability."

Then, after recording this information: "Is there anyone else under 65 years of age with a physical or mental condition that allows him to work only occasionally or not at all?"

These questions were supported by careful instructions to the interviewers explaining the objectives of each question and giving examples of types of persons who should and should not be included.

For each person under 65 years of age who was recorded as a result of these two questions as unable to work or carry on usual activities or who had been previously recorded on the regular part of the schedule as being "unable to work," the duration of disability prior to the day of interview was determined and also whether he or she was working (for pay or profit or without pay on a family farm or business) before becoming disabled. This last item of information has not been utilized in the tables presented here, but it was included in the basic tabulations.

In tabulating the results no attention was paid to which question of the three mentioned was responsible for a person's inclusion in the category of "disabled on the day of visit." It was felt that, while some might have been ill in the ordinary sense and others might have been incapacitated by some physical or mental condition that prevented them from working but did not make them ill, not all of those in any one category would necessarily be picked up by the same question. The different questions served rather as a net to take in all persons who were disabled according to the definition cited at the beginning of this report.

In household surveys of this sort the wording of questions on disabling illness, and, in fact, the wording of any questions, even on matters that appear to be most objective, is of great importance. It was anticipated in planning the present survey that the planners' concept of disability would not entirely correspond with that which the household informant had in mind when giving the answers. The intention was to include as disabled not only those who were unable to work or to carry out their regular activities on the day of visit because of illness in the ordinary sense of that word but also those who, though not ill, had a residual condition, such as paralysis or loss of limbs, that completely prevented them from working or at least made it impossible for them to hold even a regular part-time job. And it was intended that the duration given should be the continuous period of time, measuring backward from the day of visit, that the individual had been unable to work or unable to hold even a regular part-time job owing to this illness or condition. To give two illustrations: (1) A totally blind person who regularly sold pencils for a few hours each day at a street corner was not to be considered disabled; (2) if a person, afflicted with heart disease for the last 10 years but able to keep his job, was unable to go to his work for the last 3 weeks because of a period of heart decompensation, he was to be considered as disabled, and the duration was to be taken as 3 weeks and *not* as 10 years.

Despite the precautions taken in wording the questions and in instructing the interviewers, there were some instances when persons recorded as having been disabled for a year or more had done 20 or 30 hours of work the previous week, and other instances when persons reported to have been disabled 10 years or more still classified themselves as employed. Neither of these is necessarily inconsistent with the definition, but inspection of the schedules in a number of these cases indicated that in a few there had certainly been a misunderstanding of the word "disability." It was taken in the legalistic sense of a disability, such as the loss of use of a part or organ, even when this did not prevent the person from working, and the duration was taken as the total time since the onset of that condition.

In general, however, the results were reasonable and not in unexplainable disagreement with those from other studies.

The Sample

No attempt will be made to describe in any detail here the design of the Census Bureau's household sample since it has been described elsewhere (*3*, *4*). About the middle of each month, census interviewers visit some 25,000 households, located in 68 sample areas in 42 States and the District of Columbia. The sample was designed to yield relatively reliable estimates for the civilian noninstitutional population of the United States as a whole. It is not feasible, therefore, to make regional estimates from it. Such estimates would have too high a sampling variability to be useful.

The Census Bureau sample is what is known as a "probability sample." This means that each element in the population being sampled has a chance of being included in the sample and that this chance, or probability, is known. (In this case the ultimate sampling elements are small units of area from which approximately six households are selected for the sample.) The significance of the "probability-sample" feature is that it permits estimates to be made of the range of possible error in the results. Here the word "error" means the difference between a result obtained from the sample and the corresponding result that would have been obtained had an exactly identical survey been made of every household in the United States, using the same interviewers, the same instructions, the same questions, and so forth. Some of the error estimates for the results on persons with a disabling illness or condition in the United States in February 1949 are shown in the appendix.

The interviewers used in the survey are part-time workers who, on the average, have had considerable experience in collecting the information on the labor force and also in interpreting and applying special instructions for the supplementary questions that are added to the schedule from time to time. They are coached and rehearsed on the new questions as well as on the old ones by local supervisors who are full-time employees.

The only parts of the population which were not sampled in the survey are (1) the military population, (2) the transient population, consisting of individuals having no household of which they would be considered a member though absent,[5] and (3) the inmates of resident institutions, such as prisons, jails, mental hospitals and institutions, homes for the aged, homes for incurables, and orphanages. The omission of the institutional population is a serious one from the point of view of counting persons with disabling illness, and it should be constantly borne in mind that the figures presented exclude such persons from 14 to 64 years of age in resident institutions. However, anyone in a nonresident hospital, such as a general hospital, would be counted in the household of which he was usually a member.[6] The same would be true of persons who were temporarily absent from their homes on business or vacation.

Some data on the number of persons currently in resident institutions for the care of the sick can be obtained from other sources; these are discussed later.

Numbers of Persons with a Disabling Illness or Condition

The survey revealed that on an average weekday in February 1949 there were 4,569,000 persons from 14 to 64 years of age in the civilian noninstitutional population of the United States who were unable to work because of illness or a disabling condition. Since there was no important epidemic of upper respiratory disease in the country at that time, this figure is not as heavily weighted with short-duration cases as it might be in other winters. However, experience in other studies indicates that February may be the highest or next-to-highest month in the year in prevalence of disabling illness. The seasonal cycle probably varies for different parts of the country and, since the other comparable data available are solely for the eastern seaboard, this point cannot be determined with any accuracy. A 5-year study in Baltimore revealed that the ratio of the prevalence in February to that for an average of the 12 months of the year varied from 1.18 to 1.66, the variation being chiefly due to the seasonal cycle of the acute respiratory diseases. Not strictly comparable but, nevertheless, pertinent are the monthly labor force data from the Current Population Survey itself. The number of persons with a job but not at work during the whole of the February 1949 survey week was 15 percent higher than the average of the corresponding figures for the 12 months, September 1948 to August 1949. A fair guess might be that the prevalence found for the country in February 1949 was 20 percent above the average for the year from September 1948 to August 1949. Since most of the change occurs in the short-duration cases, figures from this survey on persons disabled 3 months or longer are probably influenced only very slightly by this factor. The survey should certainly be repeated in other months to gain more information on seasonal variation.

---

[5] Since the February 1949 survey, the sample design has been changed so that it now includes the transient population.

[6] There is obviously a possibility of undercounting of persons who have been in a general hospital for so long a time that they are no longer thought of as a member of the household.

Of the total number disabled, 2,417,000, or 53 percent, had been disabled for 3 months or longer at the time of visit. Except for approximately 1 percent for whom duration of disability was not reported, the remainder had been disabled less than 3 months. Disabled persons in resident institutions are excluded from these figures, as stated previously. The great majority of these would be in the 3-months-or-longer group. Hence, the total of 2,098,000, representing persons reported as having been disabled less than 3 months, is not greatly affected by the exclusion of resident institutions from the survey.

In the 1940 census, the institutional population from 14 to 64 years of age numbered 955,000 persons of whom 215,000 were in prisons or reformatories, 97,000 in local jails or work-houses, 503,000 in mental institutions, 119,000 in homes for the aged, infirm, or needy, and 20,000 in other or unknown types of institution. By 1947 the number of persons of all ages in permanent-care mental hospitals had increased by approximately 13 percent (*5*). By the time of this survey it was probably 15 percent higher than in 1940. Hence, it may be estimated that because of the exclusion of mental hospitals from the survey coverage at least 580,000 disabled persons should be added to the total of those disabled for 3 months or longer. The number disabled on any one day in other types of institutions can only be estimated very roughly. For the age group 14–64 years it would be probably in the neighborhood of 125,000. In addition to those not covered because they were in resident institutions, there were about 38,000 on the sick list in the armed services in February 1949. All together, therefore, the number of persons from 14 to 64 years of age with a disabling illness or condition was about 5,310,000 in February. This represented 5.4 percent of the total population at these ages.

Since so little is known about the disabling illness in resident institutions other than mental hospitals, other discussion of disability statistics is restricted to the estimates for the noninstitutional population from the sample survey.

Percentage of Persons with Disabling Illness or Condition

Two simple kinds of rates can be computed from the estimates of numbers of disabled persons in various segments of the population. One is simply the percentage of persons in the given population group found to be disabled at the time of the visit. The other is the average number of days of disability that might be expected in a year for each person in this group. However, the latter rate is obtained by multiplying the number disabled on the day of the visit by 365 to give the estimated number of person-days of disability in a year (provided the February experience could be considered as average), and then dividing by the population. Hence, it is obvious that the average number of days of disability per person per year can be computed simply by multiplying the percentage of the population disabled on the day of visit by 3.65.[7] It should be remembered that this will still yield a rate for February which is expressed on an annual basis by convention. It is subject to the same sort of seasonal variation as the percentage of persons disabled on the day of visit. Since the second rate can be obtained so readily from the first, none of the rates for days of disability per person will be shown.

Table 1 presents the number and percentage of persons with a disabling illness or condition by age and sex for each major category of the labor force and non-labor force population from 14 to 64 years of age. In this table and in others showing the employment status of the population, the group of persons who, because of a long-term illness or condition, are not working or looking for work and who do not anticipate being able to return to the labor force within 6 months is shown as a separate category. It is not certain, of course, that all the females falling under this heading would have been in the labor force (that is, employed or seeking work) had they not been disabled. There is probably no clear dividing line between the females classified as "unable to work" and the housewives who have been disabled for long periods of time. It will be apparent from the statistics on duration of disability to be shown later that, insofar as duration is a measure of severity, the "unable to work" category for both males and females contains the most severely disabled persons. The prevalence rate for all persons in the group is 100 percent.

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[7] When applied to the percentage disabled in the civilian noninstitutional population from 14 to 64 years of age this yields an average of 17.2 days of disability per person per year.

Table 1. *Estimated*[1] *number and percentage of persons with a disabling illness or condition in the civilian noninstitutional population, 14–64 years of age; by age, sex, and employment status: United States, February 1949*

Age by years and sex	Total in and out of labor force	In labor force survey week				Not in labor force survey week			
		Employed			Unemployed	Keeping house	In school	Unable to work	Other
		Total	In agriculture	In other industry					
Number of disabled persons (in thousands)									
Both sexes	4,569	1,425	228	1,197	175	1,230	189	1,206	345
14–19	387	77	11	67	14	36	160	66	35
20–24	364	127	10	117	10	102	14	75	36
25–34	650	240	24	217	22	213	16	126	35
35–44	797	299	36	263	47	262	--------	136	51
45–54	1,044	344	56	287	48	285	--------	289	80
55–64	1,330	339	92	247	35	334	--------	514	111
Male	2,341	983	218	765	143	9	104	855	248
14–19	196	46	11	36	7	--------	78	44	21
20–24	150	61	10	51	7	--------	12	46	24
25–34	274	139	24	116	19	5	14	78	19
35–44	366	204	34	170	37	--------	--------	90	34
45–54	566	264	54	209	43	2	--------	204	54
55–64	791	269	85	184	31	2	--------	393	97
Female	2,228	442	10	432	32	1,221	85	351	97
14–19	191	31	--------	31	7	36	82	22	14
20–24	214	66	--------	66	3	102	2	29	12
25–34	376	101	--------	101	3	208	2	48	16
35–44	431	95	2	93	10	262	--------	46	17
45–54	478	80	2	78	5	283	--------	85	26
55–64	539	70	7	63	4	332	--------	121	14
Percentage of disabled persons in each group									
Both sexes	4.72	2.62	3.62	2.49	5.70	4.26	2.34	100.00	31.77
14–19	3.12	1.91	1.36	2.08	2.92	3.53	2.39	100.00	28.69
20–24	3.20	1.99	1.79	2.01	1.61	3.20	1.37	100.00	37.11
25–34	2.86	1.76	1.94	1.75	3.53	2.72	4.72	100.00	28.23
35–44	3.93	2.30	2.57	2.27	8.53	4.05	0	100.00	45.95
45–54	6.17	3.29	4.86	3.09	11.03	5.14	0	100.00	40.40
55–64	10.16	4.90	8.08	4.28	9.56	6.89	0	100.00	25.52
Male	4.98	2.55	3.99	2.31	6.28	(2)	2.36	100.00	29.67
14–19	3.24	1.95	1.51	2.21	2.35	(2)	2.40	100.00	23.86
20–24	2.76	1.51	2.04	1.44	1.51	(2)	1.46	100.00	39.34
25–34	2.54	1.41	2.27	1.32	4.15	(2)	4.59	100.00	22.89
35–44	3.71	2.20	2.89	2.10	9.18	(2)	0	100.00	45.33
45–54	6.78	3.46	5.51	3.14	12.65	(2)	0	100.00	36.49
55–64	12.12	4.96	8.20	4.20	9.90	(2)	0	100.00	25.46
Female	4.48	2.80	1.21	2.88	4.03	4.23	2.31	100.00	38.80
14–19	3.01	1.86	0	1.95	3.87	3.56	2.39	100.00	41.18
20–24	3.60	2.82	0	2.91	1.94	3.20	0.99	100.00	33.33
25–34	3.16	2.66	0	2.79	1.82	2.66	5.88	100.00	39.02
35–44	4.14	2.56	0.89	2.67	6.76	4.05	0	100.00	47.22
45–54	5.58	2.85	1.16	2.96	5.26	5.12	0	100.00	52.00
55–64	8.21	4.69	6.86	4.53	7.55	6.85	--------	100.00	25.93

[1] All figures in this and other tables are estimates from a sample survey and are, therefore, subject to sampling variability which may be relatively large in the case of the smaller figures and small differences between figures. See appendix for measures of sampling variability. Each cell of the tables was estimated separately; hence, the detail figures do not in all cases add to give the exact total shown.

[2] Percents not shown where based on an estimate of less than 100,000 population for all ages.

The column labeled "Other" in table 1 includes retired and voluntarily idle persons, seasonal workers for whom the survey week fell in an "off" season, some persons doing less than 15 hours a week of unpaid family work, and, finally, persons who were ill during all of the week to which the labor force questions applied and did not specify what they would have been doing if they had not been sick.

Among the points of interest revealed by this table are:

1. Prevalence of disabling illness among males was higher than that among females at ages 45–64 years, about the same as that among females at 14–19 years, and less than the female prevalence at 20–44 years. Registration statistics indicate that the ratio of male mortality to female mortality is greater than 1 at all these ages, but the excess is greatest at 15–24 years and 45–64 years.
2. The 1,206,000 persons from 14 to 64 years of age who considered themselves unemployable and, hence, had no jobs and were not seeking work because of their health, represent about four-tenths as great a number as the February unemployed in the same ages, estimated by the Census Bureau at 3,071,000. Experience has shown that nearly all of the former group can actually do useful, gainful work, after rehabilitation, yet they receive only a small fraction of the attention that is devoted to the unemployed as a part of our potential manpower.
3. Rates for male unemployed appear to be considerably higher in this survey than in surveys made when there were many more unemployed, indicating that, when employment is high, a higher proportion of those seeking work are in bad health because most of those in good health have already found jobs. This also suggests the possibility that some of those who class themselves as "seeking work" are actually unable to work.
4. Prevalence of disabling illness among male workers employed in agriculture is greater than among nonagricultural male workers.
5. Employed females have lower rates than housewives.

Another comparison between the various employment status groups is provided in table 2 in which prevalence is shown relative to the total prevalence for both sexes and all categories which is taken as 100. The effect of differences in the age composition of the population from one group to another has been equalized in these ratios by the manner of computation.[8] This table also shows the relative prevalence for married and unmarried (including widowed and divorced) females. Some of the ratios for married and unmarried females are unreliable because of the small numbers of disabled persons involved, but no ratio is shown where the population in all age groups is estimated at less than 100,000. Some of the differences that appear can also be accounted for as the result of a correlation between the existence of a disabling illness or condition in an individual and the employment status reported for that individual. One example will suffice to illustrate this. In the sample of about 25,000 households, no married females employed in agriculture were reported as disabled

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[8] Each ratio is 100 times the quotient of the observed estimate of number of persons disabled and the "expected" number disabled. The latter number is obtained by multiplying the age-specific prevalence rates for the entire population surveyed by the estimated populations in each age group of the particular sex-employment status category.

Table 2. *Relative prevalence of disabling illness in the civilian noninstitutional population 14–64 years of age, by employment status, sex, and marital status for females: United States, February 1949*

Sex and marital status	Total civilian noninstitutional population 14–64 years	In labor force survey week					Not in labor force survey week				
		Total	Employed			Unemployed	Total	Keeping house	In school	Unable to work	Other
			Total	In agriculture	In other industry						
Both sexes	100	59	55	71	53	127	160	85	75	1,436	486
Male	105	57	53	78	48	135	468	(1)	75	1,379	428
Female	95	64	63	25	65	100	110	85	74	1,595	746
Female:											
Married	86	69	69	0	75	80	92	78	(1)	1,364	(1)
Not married	117	59	56	83	55	118	179	124	75	1,675	600

[1] Ratio not shown because based on estimated population less than 100,000.

NOTE.—Prevalence in the entire civilian noninstitutional population 14–64 years of age is taken as 100. Each relative prevalence is adjusted for age differences in the various population groups.

on the day of visit, this despite the fact that, on the basis of the estimated population and the rates for fairly similar groups, at least 10 such instances might have been expected. This probably is at least partly due to the lack of a clear distinction between married women keeping house on a farm and married women on a farm considered as employed in agriculture. The circumstance that a woman was disabled on the day of visit might easily have led in some cases to reporting her as a housewife rather than as working on the family farm.

Naturally, the population group whose employment status is given as "unable to work" has the highest prevalence of disabling illness since all in it are disabled by definition. The group of "others" not in the labor force, consisting chiefly of retired and voluntarily idle persons and ill persons whose labor force status was unknown, had from four to seven times as much disabling illness as the average for the entire population. But, omitting these two groups in which the definition of the category leads to the automatic inclusion of ill persons, the highest group in amount of disability was that of the unemployed. The apparently great difference between the prevalence for the male and female unemployed should not be considered significant. It can be shown that a difference as great as this could easily be a chance result in a sample of this size. (In the National Health Survey of 1935–36 the prevalence of disabling illness was higher for unemployed females than for unemployed males.)

The housekeepers, particularly the unmarried females in this class, were next highest in amount of disability. The rate for the students is not significantly different from that for housekeepers. Finally, the employed persons had the lowest prevalence of disability. However, within the employed group, as has already been mentioned, there were some rather marked differences. Males in agricultural employment had about half again as much disability as their fellow workers in nonagricultural industry. The comparison for married females is of questionable value for reasons previously stated.

The figures in the total column, for all employment status groups combined, indicate that males have 5 percent more and females 5 percent less than the over-all prevalence of disability, but the index for unmarried females is 17 percent above that for all groups combined and is approximately a third higher than the index for married females.

Race differences in the prevalence of disabling illness are shown in figures 1 (a), 1 (b), and 1 (c). The familiar fact of a higher prevalence of disabling illness at every age in the nonwhite population is clearly seen in figure 1 (a), but not so familiar is the marked sex contrast in this excess revealed in the other two graphs. Among males at various ages the ratio of nonwhite to white prevalence varies from 0.99 to 2.05. Among females, on the other hand, the ratios vary from 1.15 to 2.32. The apparently inconsistent results for the youngest age group may be the result of chance fluctuations in the nonwhite rates. However, there is no question of the significance of the sex difference in the excess of nonwhite over white prevalence.

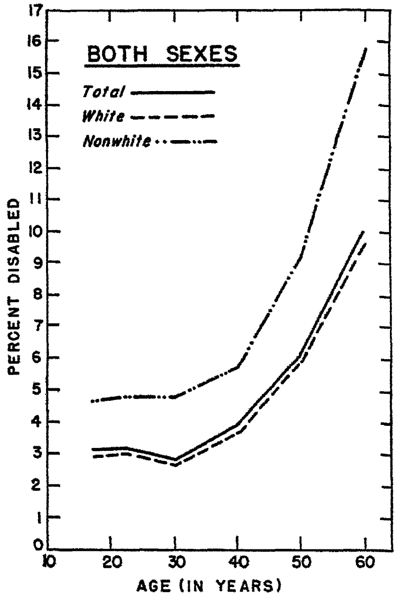

Figure 1 (a). Percentage of persons 14–64 years of age in the civilian noninstitutional population of the United States with a disabling illness or condition on the day of the survey, by race: February 1949.

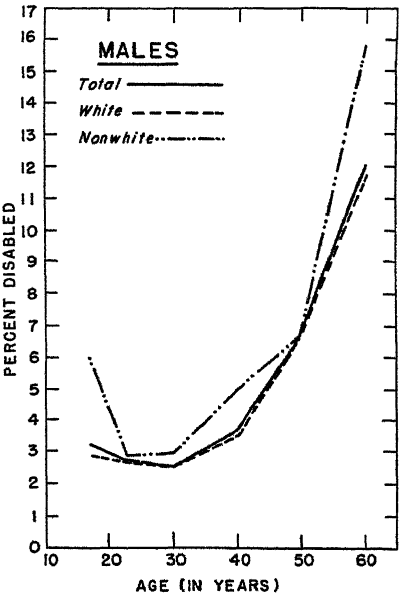

Figure 1 (b). Percentage of males 14–64 years of age in the civilian noninstitutional population of the United States with a disabling illness or condition on the day of the survey, by race: February 1949.

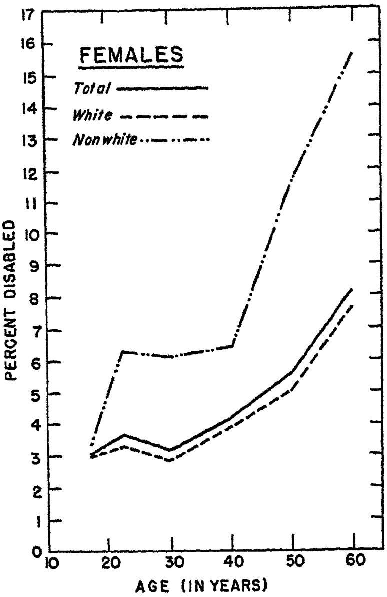

Figure 1 (c). Percentage of females 14–64 years of age in the civilian noninstitutional population of the United States with a disabling illness or condition on the day of the survey, by race: February 1949.

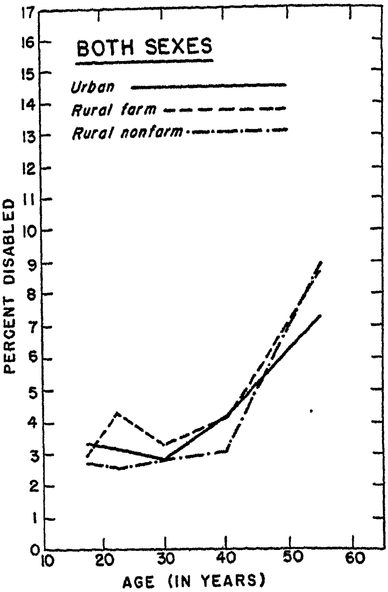

Figure 2 (a). Percentage of persons 14–64 years of age in the civilian noninstitutional population of the United States with a disabling illness or condition on the day of the survey, by place of residence: February 1949.

Table 3 is computed in the same manner as table 2. It illustrates in a summary form what has just been pointed out regarding the higher prevalence of disability in the nonwhite population.

The differences in prevalence of disability according to whether the household was an urban, rural farm, or rural nonfarm household were not so clear-cut or consistent as those which appeared when the population was classified by race. The percentages of persons in each age and sex group who were disabled on the day of visit are shown in figures 2 (a), 2 (b), and 2 (c). Since the urban population of the country constitutes roughly six-tenths of the total, the urban percentages lie rather close to those for the entire population, as may be seen by comparing these graphs with figures 1 (a), 1 (b), and 1 (c). When both

Table 3. *Relative prevalence of disabling illness in the civilian noninstitutional population 14–64 years of age, by sex and race: United States, February 1949*

	Total	White	Nonwhite
Both sexes	100	95	153
Male	105	102	133
Female	95	88	171

NOTE.—Prevalence in the entire civilian noninstitutional population 14–64 years of age is taken as 100. Each relative prevalence is adjusted for age differences in the various population groups.

sexes are considered together, there seems to be a slight tendency for the rural farm prevalence to be higher than the prevalence in the other two categories, and this is more obvious when the male percentages are examined separately. However, the pattern for the female prevalence is quite different.

Prevalence in each residence-sex group relative to the prevalence for both sexes in the entire survey and adjusted for differences in age composition, just as in tables 2 and 3, is given in table 4. The ratio for rural males appears to be significantly higher than the ratio for urban males. However, it would be desirable to have additional evidence on this point. The differences in the case of the females are too small to be adjudged significant. Yet the evidence from this survey is the first that provides an opportunity to study the question of whether the prevalence of disabling illness differs in the urban and rural parts of this country. Other surveys in which similar information was collected have either been restricted to urban or to rural areas or have been too limited in geographical coverage to permit any general conclusion to be drawn. It is a well-recognized fact that mortality is higher in urban than in rural areas, though the reasons for this are

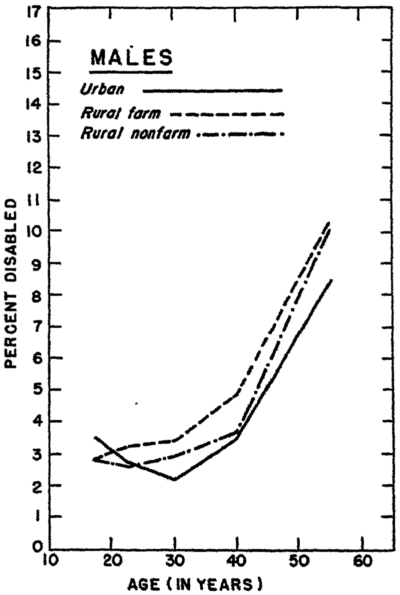

Figure 2 (b). Percentage of males 14–64 years of age in the civilian noninstitutional population of the United States with a disabling illness or condition on the day of the survey, by place of residence: February 1949.

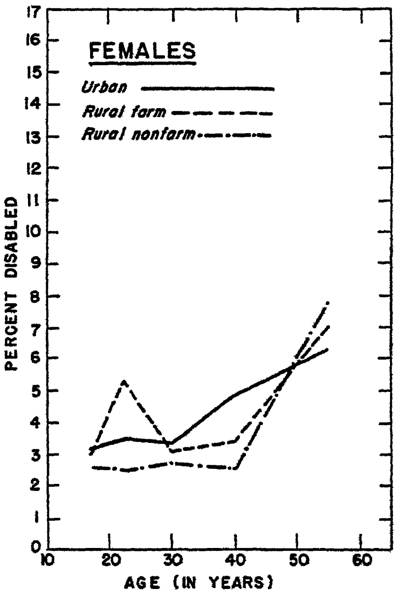

Figure 2 (c). Percentage of females 14–64 years of age in the civilian noninstitutional population of the United States with a disabling illness or condition on the day of the survey, by place of residence: February 1949.

Table 4. *Relative prevalence of disabling illness in the civilian noninstitutional population 14–64 years of age, by sex and place of residence: United States, February 1949*

	Total	Urban	Rural farm	Rural nonfarm
Both sexes	100	97	109	99
Male	105	98	119	110
Female	95	97	98	89

NOTE.—Prevalence in the entire civilian noninstitutional population 14–64 years of age is taken as 100. Each relative prevalence is adjusted for age differences in the various population groups.

not entirely understood. There is no reason to suppose that prevalence of disability should show the same pattern and, in fact, the limited evidence produced here seems to point to a difference in the opposite direction. However, it should be remembered that the concept of a disabling illness or condition, that is, an illness or condition sufficiently severe to prevent the person from doing his regular work or attending to other duties, is a concept which may easily have quite a different meaning for persons living in cities, on farms, or in rural nonfarm areas. (It most certainly has a different meaning for the housewife, the family breadwinner, the retired or voluntarily idle person, and the student.)

Duration of Disability

The only measure of the severity of the disabling illness or condition provided in this survey comes from the statement of the duration of disability prior to the day of visit. This measure must be considered a very crude one not only because previous experience has proved that the informant's statement on the length of disability is only roughly accurate, but also because the persons who have been disabled longest are not necessarily the most severely ill from the standpoint of impaired health or chances of recovery.

The estimate of the number of civilians 14–64 years of age, not in resident institutions, who had a disabling illness or condition on the day of visit is 4,516,000 if the estimate is based solely on those in the sample for whom a duration was reported. Of these, 1,640,000, or 36.5 percent, were stated to have been disabled more than 1 year. Ignoring for the moment seasonal and trend effects, the duration of disability prior to the day of visit is, on the average, only about one-half of the total duration of disability that can be expected for those who happened to be disabled on that day. In other words, if it were possible to follow all of the persons disabled on the day of the visit until their disability terminated, either in recovery or commitment to a resident institution or death, it would be found that the duration of disability subsequent to the visit would, on the average, be roughly the same as that prior to the visit. Also, the distribution of disabled cases according to duration subsequent to visit should be similar to the distribution prior to visit, again ignoring considerations of seasonal cycle or secular trend. Hence, if 36.5 percent have been disabled for a year or more at the time of the survey, then about the same proportion, though, of course, not necessarily the same individuals, will be disabled for a year or more subsequent to the survey.

To one unfamiliar with statistics of prevalence of disability such a relatively high proportion of long-term cases is surprising. The reason is that in a prevalence study the probability of finding a disabled person in the sample is proportional to the total length of his period of disability. A person with a disabling illness lasting a year has 52 times as great a chance of being found disabled in the sample as one with an illness lasting a week. The distribution of persons found to be disabled according to the length of their disability prior to the visit is not at all the same as, and should not be confused with, the distribution according to total duration that one finds by taking all the cases of disabling illness with onset during a given period and following them until their termination. The former type of distribution is the only one that can be obtained directly from a prevalence type of survey such as this, and it is far more heavily weighted with the longer cases.

The data of table 5 show the percentage distribution of disabled persons according to prior duration of disability for each age and sex category. In the last column of the table the total percentage over 3 months is given.[9] (In this and the following tables the percentages are based on all disabled persons in the group including the few for whom a duration was not reported.) The increase in the duration with age which has been observed in many other studies is clearly seen, but an interesting exception is found. There is a higher proportion of disabled males with very long durations—10 years and over—in the ages 14–24 years than there is in the ages 25–54 years. The females show a difference in the same direction which, however, is not great enough to exclude the possibility that it is a chance result. Whether this peculiarity has some artificial explanation or whether it is an actual feature of the distribution of severely disabling illness in the population cannot be determined without further evidence.

The percentage of the population in the various age and sex groups that had been disabled for specified lengths of time can be determined by multiplying the percentages in table 5 by the percentages in the first column of figures of table 1. For example, since 50.4 percent of the disabled persons of all ages, both sexes, had been disabled for more than 3 months, and since 4.72 percent of the population of all

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[9] Durations were recorded in single days up to and including 10 days, then to the nearest week through 6 weeks, to the nearest month through 11 months, to the nearest year through 9 years, and finally as 10 years for any duration over 9½ years, including disability since birth. Thus, the class interval "over 3 months" would include any duration from 3½ months up.

Table 5. *Percent distribution of disabled persons in the civilian noninstitutional population, 14–64 years of age, by duration of disability prior to day of visit: United States, February 1949*

Age by years and sex	Number disabled (in thousands)	Percent all durations	Duration of disability—percent								
			Not over 1 week	Over 1 week but not over 1 month	Over 1 month but not over 3 mos.	Over 3 mos. but not over 6 mos.	Over 6 mos but not over 1 yr.	Over 1 yr. but less than 10 yrs.	10 yrs. and over	Duration not reported	Total percent over 3 mos.
Both sexes	4,569	100.0	24.8	15.1	8.6	5.4	8.9	22.5	13.6	1.2	50.4
14–19	387	100.0	52.2	9.8	6.2	3.9	4.1	5.9	17.5	0.5	31.4
20–24	364	100.0	38.8	15.8	11.2	3.8	2.5	11.2	15.8	0.8	33.3
25–34	650	100 0	31.6	18.9	8.0	3.8	7.2	18.1	10.9	1.5	40.0
35–44	797	100.0	26.7	20.1	9.0	6.5	7.1	18.7	10.9	1.0	43.2
45–54	1,044	100 0	19.4	16.0	9.4	5.2	12.1	25.3	11.4	1.3	54.0
55–64	1,330	100.0	12.6	11.0	8.1	6.6	11.4	32.6	16.5	1.1	67.1
Male	2,341	100.0	17.7	12.5	8.3	6.0	10.9	29.0	14.4	1.2	60 3
14–19	196	100 0	50.3	6.1	6.1	3.6	7.1	4.6	21.3	1.0	36.6
20–24	150	100.0	29.5	13.4	8.1	3.4	3.4	20.8	21.5	-------	49.1
25–34	274	100.0	20.0	11.3	8.7	5.1	9.8	31.6	11.6	1.8	58.1
35–44	366	100.0	22.3	17.2	7.9	7.1	9.8	24.0	11.2	0.5	52.1
45–54	566	100.0	13.2	14.6	10.8	6.0	11.1	31.6	11.1	1.6	59.8
55–64	791	100.0	7.7	10.5	7.1	7.1	14.0	36.2	16.2	1.3	73.5
Female	2,228	100.0	32.1	17.9	9.0	4.7	6.7	15.7	12.7	1.2	39.8
14–19	191	100.0	54.2	13.5	6.2	4.2	1.0	7.3	13.5	-------	26.0
20–24	214	100.0	45.2	17.5	13.4	4.1	1.8	4.6	12.0	1.4	22.6
25–34	376	100.0	40.1	24.4	7.4	2.9	5.3	8.2	10.3	1.3	26.8
35–44	431	100.0	30.4	22.5	10.0	6.0	4.9	14.2	10.7	1.4	35.7
45–54	478	100.0	26 8	17.6	7.7	4.2	13.2	17.8	11.7	1.0	46.9
55–64	539	100.0	19.7	11.7	9.6	5.9	7.6	27.5	17.1	0.9	58.1

ages and both sexes was disabled, then 0.504 × 4.72 or 2.38 percent of the entire surveyed population had been disabled over 3 months.

The employment status and marital status groups differ markedly in respect to age; hence, comparison of the prior duration of disability between them has to be made in terms of specific age groups or in terms of some index that makes allowance for age differences. Data were not available in sufficient detail to permit the former. Therefore, the figures for the various groups in table 6 are ratios of observed to expected numbers of persons disabled for over 3 months (times 100). The expected number of persons disabled for this length of time was obtained by multiplying the proportion of disabled persons, disabled for over 3 months, in each age group of the whole survey population (see last column in top portion of table 5) by the number of disabled persons at each age in the particular employment-marital status group and then adding to get a total for all ages. Thus, the figure of 124 for unemployed males shows that the proportion of disabled unemployed males who had been disabled for more than 3 months was 24 percent higher than one might expect on the basis of the experience of all groups combined.

In general, it appears that there were higher proportions of cases of 3 months or more prior duration among both males and unmarried females than among married females. The relative percentage for males was also greater than that for unmarried females, but the dif-

Table 6. *Relative percentages of disabled persons who had been disabled over 3 months (percentage disabled over 3 months in all groups combined=100); by employment status, sex, and marital status for females: United States, February 1949*

Sex and marital status	Total civilian noninstitutional population 14-64 years	In labor force survey week					Not in labor force survey week				
		Total	Employed			Unemployed	Total	Keeping house	In school	Unable to work	Other
			Total	In agriculture	In other industry						
Both sexes	100	63	56	100	47	118	119	77	50	169	110
Male	116	73	66	100	56	124	155	(1)	71	169	125
Female	82	36	32	(1)	30	92	93	76	26	169	65
Female:											
Married	69	25	23	(1)	23	72	78	66	(1)	149	41
Not married	105	48	43	(1)	39	100	124	109	26	186	74

[1] Index not shown because of small number of disabled persons in the sample.

NOTE.—Each index has been adjusted for age differences in the various population groups. See text for further explanation.

ference is not quite large enough to be statistically significant. From data not contained in these tables it was observed that the very long durations—over 10 years— were found most frequently among disabled unmarried females. Their severe disability undoubtedly affected their chances for marriage.

The relative percentages shown in table 6 must be interpreted with great caution for the smaller population groups, such as the unemployed, the persons in school, those employed in agriculture, and "others" not in the labor force. The sampling errors of the adjusted percentages for these groups are quite high. As a general rule, in the population groups having a relatively high proportion of disabled persons with over 3 months' disability, there was also found a relatively high prevalence, and vice versa. This may be seen by comparing table 6 with table 2. Such a result was to be expected since, as has already been pointed out, the persons with a long disabling illness are more likely to be found disabled in the survey. One departure from this association is worth mentioning. Employed females were more frequently found disabled on the day of the survey than were the employed males, but a considerably smaller proportion of the females had been disabled for over 3 months.

Although tables showing the prior duration of disability of white and nonwhite population, and of urban, rural farm, and rural nonfarm population are not shown for lack of space, the figures from the survey indicated the following:

1. For both sexes combined there was very little difference between white and nonwhite disabled persons in the proportion disabled for longer periods, but the disabled white males had more of the longer durations than the disabled nonwhite males. In the case of the females the difference was in the opposite direction but was not great

enough to rule out the possibility that it was a chance result. It appears that the higher proportion of long-duration cases among disabled males, previously mentioned, was a characteristic of the white population only. There was no evidence of a sex difference in the nonwhite population.

2. The rural population had a higher proportion of disabled males with long durations than did the urban population. In the case of the females, however, there was no indication of a significant difference in the duration for disabled persons living in urban and rural areas. Males exceeded females in this respect in all three types of area just as they did in the country as a whole.

Persons "Unable-To-Work" or Disabled 10 Years or More

As might be expected, the highest proportion of persons with a disabling illness or condition that had lasted more than 3 months at the time of visit was found among those not included in the labor force because they were stated to be "unable to work" (table 6). About nine-tenths of such persons were reported either to have been unable to do their regular work or other duties or at least unable to do anything but occasional part-time work for more than 3 months. The remaining one-tenth should represent persons who had to quit their jobs within the last few months owing to their health and did not anticipate being able to return, but, since this proportion seems a little too large, it may also include some who misunderstood the questions. In any case, there are some disabled persons classified as "unable to work" who will, in fact, return to work of a less taxing nature or even to their old jobs. But these would tend to be counterbalanced by the number of disabled persons who, though listed as "employed" or "seeking work" will actually never return to work.

It was also found that 18.2 percent of the "employed" disabled persons covered in the survey were reported to have been disabled for more than 1 year (actually more than a year and 6 months since durations of a year or more were recorded to the nearest year). This undoubtedly includes some individuals who were not disabled according to the definition used in this survey but who had some severe handicapping condition. It also includes some who came under the definition because, although they did do some gainful work in the week prior to the visit, they suffered from some physical or mental condition that ordinarily prevented them from doing anything except irregular part-time work. Another part of the 18.2 percent is made up of persons who call themselves employed and still have hopes of returning to their jobs but will never do so.

Of the estimated 75,000 employed and 15,000 unemployed persons who were reported to have been disabled for 10 years or longer it can only be said (1) that the number is so small as to be of little statistical significance in a sample of this size, and (2) that probably it is largely made up of persons to whom the concept of disability intended in this study was not adequately made clear.

It may safely be stated, however, that there are 1,206,000 persons in the working ages of the population of this country, not being cared for in resident institutions, who are incapacitated to such an extent that they consider themselves unable to work at all, now or in the foreseeable future. And, in addition, there are 254,000 persons with some physical or mental condition that at least seriously handicaps them in their work and has lasted for 10 years or longer. This total of 1,460,000 individuals, plus an estimated 700,000, also between 14 and 65 years of age, in resident institutions, constitutes the least easily reduced portion of that lost manpower in the living population for which chronic disease and handicapping conditions are responsible.

Summary

The results of a sample survey conducted in February 1949 to determine the prevalence on the day of the interview of disabling illness, injuries, and impairments are described. The study was based on door-to-door interviewing of some 25,000 households. The sample used was the Census Bureau's Current Population Survey, and the questions on disabling illness and other disabling conditions were added to the regular monthly schedule for that survey. Prevalence of disabling illness and other conditions preventing the individual from working or carrying on his usual activities on the day of the visit was determined for persons from 14 to 64 years of age. Prior duration of the disability was also obtained.

The survey revealed that on an average weekday in February 1949 there were about 4,569,000 persons from 14 to 64 years of age in the civilian population of the entire United States disabled by illness or some condition that prevented them from doing anything but occasional part-time work. This does not include persons between these ages in resident institutions or in the armed services. A rough estimate for these two categories, not covered in the survey, brings the total up to 5,310,000, or 5.4 percent of the population between these ages.

It is estimated that, including approximately 700,000 in resident institutions, there are 2,160,000 persons from 14 to 64 years of age who are incapacitated to such an extent that they must be considered to be out of the labor force permanently or at least for 10 years or longer.

The report also compares the prevalence by age, race, urban, or rural residence, and prior duration of disability, but no data on cause of disability were obtained.

APPENDIX

Sampling Variability

The following table shows the approximate amount of variation due to sampling for various sizes of estimates of numbers of disabled persons in the United States. The chances are about 19 out of 20 that the difference between the estimate obtained from the sample and the figure that would have been obtained if an identical survey had covered every household in the country is less than the figure in the second column.

Size of estimate	*Sampling variability*
10, 000	11, 000
50, 000	26, 000
100, 000	36, 000
300, 000	63, 000
500, 000	81, 000
1, 000, 000	110, 000
2, 000, 000	160, 000
4, 500, 000	240, 000

Thus, for example, the following statement can be made about the estimate of 4,569,000 civilians from 14 to 64 years of age outside of resident institutions disabled on the day of the survey. If an identical survey, using similar enumerators and the same questions, had been carried out in which every household in the country had been visited, the chances are about 19 out of 20 that the count of disabled civilians between these ages would differ by less than 240,000 (or about 5 percent) from the estimate presented here.

Estimated percentages are relatively more reliable than the corresponding absolute estimates. The following table shows the approximate sampling variability of the percentages derived from the survey.

If the size of the base is—	And if the estimated percentage is—				
	2	5	10	20	50
	Then the chances are about 19 out of 20 that the difference between the estimated percentage and the percentage which would have been obtained from an identical survey covering all households is less than—				
100, 000, 000	0. 2	0. 2	0. 3	0. 5	0. 6
50, 000, 000	. 2	. 4	. 5	. 6	. 8
20, 000, 000	. 4	. 6	. 8	1. 0	1. 3
10, 000, 000	. 5	. 8	1. 1	1. 4	1. 8
5, 000, 000	. 7	1. 1	1. 5	2. 0	2. 6
3, 000, 000	. 9	1. 4	2. 0	2. 6	3. 3
2, 000, 000	1. 1	1. 8	2. 4	3. 2	4. 0
1, 000, 000	1. 6	2. 5	3. 4	4. 6	5. 7
500, 000	2. 3	3. 5	4. 9	6. 5	8. 1
200, 000	3. 6	5. 6	7. 7	10. 2	12. 8

Since space has not permitted the publication of the estimated populations from which the percentages were computed, the above table will have a limited usefulness. However, it is presented here to give an idea of the general magnitude of possible errors due to sampling. As an example, the percentage of disabled persons in the civilian noninstitutional population 14 to 64 years of age was found to be 4.72. This was based upon an estimated population of 96,763,000 between the stated ages. Thus, the chances are about 19 out of 20 that the percentage obtained from an identical survey covering every household in the country would differ from 4.72 by less than 0.2 percent. In other words it would probably lie somewhere between 4.5 and 4.9 percent.

Again it must be emphasized that any type of bias that is inherent in the survey method, coverage, phrasing of questions, or interview makes for additional error, not included in the above measures of reliability.

Comparison of Results with National Health Survey

The possibilities for comparison of data from the February 1949 survey with corresponding figures from the National Health Survey of 1935–36 are rather limited. The National Health Survey (NHS) covered only urban population and most of the disability prevalence statistics available relate to the labor force only, while in the February 1949 survey (CPS) tabulations were not made showing employment status for urban areas only. However, in a special tabulation of NHS data based on the white population of eight of the survey cities, prevalence of disabling illness is shown for labor force and non-labor force combined, and this can be compared with data for white and for urban population from CPS. Unfortunately the white-urban combination is not available in the CPS tabulations, so, again, statistics from completely comparable population groups in the two surveys cannot be set side by side.

Percentage of persons disabled on day of visit

[Data for white population of 8 NHS cities versus CPS data]

Sex and age	8 cities NHS	CPS white	CPS urban	CPS Total
Both sexes:				
15–24 years [1]	2.77	2.97	3.22	3.16
25–44 years	3.95	3.18	3.44	3.36
45–64 years	6.52	7.57	7.37	7.91
Male:				
15–24 years [1]	2.29	2.82	3.11	3.01
25–44 years	3.00	3.02	2.78	3.10
45–64 years	6.24	9.00	8.48	9.13
Female:				
15–24 years [1]	3.19	3.10	3.33	3.29
25–44 years	4.80	3.33	4.03	3.62
45–64 years	6.78	6.18	6.33	6.72

[1] CPS data are for 14–24 years.

In view of the 13 years separating these surveys, the difference in the types of enumerators used, and the difference in the form of the interview (though the definition of disability used in each survey was approximately the same), it seems rather remarkable that the results should be as close together as they are.

ACKNOWLEDGMENT

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Communities Awarded Milk Sanitation Ratings of 90 Percent or More During 1948 and 1949

This is the semiannual revision of the list of Public Health Service milk ordinance communities which were reported by State milk-sanitation authorities during the 2-year period January 1, 1948 to December 31, 1949 as having a market milk rating of at least 90 percent. The inclusion of a community in this list means that if pasteurized milk is sold in the community it is of such a degree of excellence that the weighted average of the percentages of compliance with the various items of sanitation required by the Public Health Service Milk Ordinance for grade A pasteurized milk is 90 percent or more, and that, similarly, if raw milk is sold in the community, it so nearly meets the

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From Division of Sanitation, Milk and Food Branch.

standards that the weighted average of the percentages of compliance with the various items of sanitation required for grade A raw milk is 90 percent or more.

These ratings are not a complete measure of safety, but represent the degree of compliance with the grade A standards. High-grade pasteurized milk is safer than high-grade raw milk because of the added protection of pasteurization. Safety estimates should take into account the percentage of milk pasteurized, which is given in the table. To obtain this added protection, those who are dependent on raw milk can pasteurize the milk at home by the use of an approved home pasteurizer or by either of the following methods: (1) After the

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, 1948–49

Community	Percent of milk pasteurized	Date of rating
ALL MARKET MILK PASTEURIZED		
ALABAMA		
Auburn	100	Sept. 29, 1949
Birmingham and Jefferson County	100	Nov. 17, 1949
COLORADO		
Colorado Springs	100	Nov. 1949
FLORIDA		
Panama City	100	Sept. 18, 1948
GEORGIA		
Atlanta	100	Apr. 24, 1948
Columbus	100	Oct. 27, 1949
Cordele	100	Sept. 8, 1949
Quitman	100	Aug. 25, 1949
West Point	100	Mar. 29, 1949
IDAHO		
Bonners Ferry	100	May 14, 1949
Caldwell	100	Apr. 14, 1949
Idaho Falls	100	Aug. 24, 1949
Preston	100	Nov. 16, 1948
Sandpoint	100	May 14, 1949
ILLINOIS		
Champaign-Urbana	100	Aug. 18, 1948
Chicago	100	Oct. 28, 1949
Elgin	100	Dec. 8, 1949
Glencoe	100	Nov. 7, 1949
Highland Park	100	Do.
Kenilworth	100	Do.
Lake Bluff	100	Do.
Lake Forest	100	Do.
Northfield	100	Do.
Oak Park	100	Sept. 1949
Skokie	100	Nov. 7, 1949
Waukegan	100	Nov. 2, 1949
Winnetka	100	Nov. 7, 1949
INDIANA		
Indianapolis	100	July 1948
Salem	100	Apr. 9, 1948
South Bend	100	Nov. 1948
KENTUCKY		
Owensboro	100	Apr. 8, 1949
NORTH CAROLINA		
Mars Hill	100	Dec. 9, 1949
OKLAHOMA		
Seminole	100	May 5, 1948
Sulphur	100	July 30, 1948
TENNESSEE		
Bristol	100	Nov. 4, 1949
Chattanooga	100	Oct. 26, 1949
Clinton	100	May 25, 1948
Erwin	100	Feb. 17, 1949
Fayetteville	100	May 10, 1949
Greenville	100	Oct. 7, 1949
Kingsport	100	Sept. 23, 1949
Knoxville	100	Do.
Maryville-Alcoa	100	Aug. 31, 1948
Morristown	100	Oct. 13, 1949
Shelbyville	100	June 13, 1949
TEXAS		
Galveston	100	Apr. 18, 1949
Gladewater	100	July 25, 1949
Houston	100	Dec. 3, 1948
Kilgore	100	July 25, 1949
Lufkin	100	Apr. 12, 1949
Pampa	100	May 24, 1948
San Antonio	100	June 21, 1948
Texarkana	100	Mar. 30, 1949
Texas City	100	Apr. 25, 1949
Tyler	100	Mar. 31, 1948
UTAH		
Ogden	100	June 1, 1949
Provo	100	Apr. 29, 1949
Salt Lake City	100	May 27, 1949
VIRGINIA		
Bristol	100	Nov. 4, 1949
Richmond	100	May 1948
Suffolk	100	Apr. 1948

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, 1948–49—Continued

Community	Percent of milk pasteurized	Date of rating	Community	Percent of milk pasteurized	Date of rating
BOTH RAW AND PASTEURIZED MARKET MILK					
GEORGIA			OREGON		
La Grange	76.2	Mar. 29, 1949	Portland	99.2	May 24, 1949
Macon	97.1	Sept. 13, 1949			
Thomasville	81.5	July 28, 1948	TENNESSEE		
Tifton	92	Apr. 15, 1948			
			Elizabethton	99	May 24, 1948
IDAHO			Murfreesboro	98	July 27, 1949
Boise	99.3	Apr. 30, 1949	Pulaski	91.6	May 6, 1949
Payette	72	Apr. 14, 1949			
Weiser	92.1	Apr. 13, 1949	TEXAS		
			Bryan	98.8	Feb. 12, 1949
NORTH CAROLINA			Fort Worth	99.9	Mar. 9, 1948
			Longview	99	July 27, 1949
Avery County	73	July 12, 1949	Lubbock	98.2	July 15, 1949
			Palestine	79.8	Apr. 28, 1949
OKLAHOMA			Paris	91.8	Dec. 13, 1949
			Wichita Falls	99	Mar. 29, 1948
Lawton	92.3	June 30, 1948			
Muskogee	88	Apr. 2, 1948	VIRGINIA		
Shawnee	96	June 3, 1948	Emporia	26	Jan. 1948

NOTE 1. In these communities the pasteurized market milk shows a 90 percent or more compliance with the grade A pasteurized milk requirements, and the raw market milk shows a 90 percent or more compliance with the grade A raw milk requirement of the Public Health Service Milk Ordinance and Code.

Note particularly the percentage of milk pasteurized in the various communities listed. This percentage is an important factor to consider in estimating the safety of a city's milk supply. All milk should be pasteurized or boiled, either commercially or at home, before it is consumed. See text for home method.

NOTE 2. In the preceding 90 percent list published in PUBLIC HEALTH REPORTS, Aug. 12, 1949, East Peoria was erroneously included in place of East St. Louis, Ill. The latter is not shown in the present list because the rating is now more than 2 years old.

water in the bottom of a double boiler has been brought to a vigorous boil, place the inner container with milk in the outer container, cover it, and continue to apply the same heat for 10 minutes; or (2) heat the milk in an open saucepan over a hot flame to 165° F., stirring constantly, then immediately place the vessel in cold water and continue stirring until cool, changing the water when it warms up; however, if a dependable thermometer is not available, bring the milk to a boil instead. Method 1 produces a cooked flavor, while method 2 is not quite as safe as method 1.

The milk ordinance recommended by the Public Health Service is now in effect statewide in 10 States, as well as in 214 counties and 1,209 municipalities located in 39 States. It has been adopted as a regulation by 32 States and Territories.

The primary reason for publishing the rating lists is to encourage these communities to attain and maintain a high level of excellence in the enforcement of the ordinance. No comparison with communities operating under other milk ordinances is intended or implied. Some communities which have high-grade milk supplies are not included because arrangements have not been made for the determination of their ratings by the State milk-sanitation authority. In other cases the ratings which have been submitted are now more than 2 years old and have therefore lapsed. In still other communities with high-grade milk supplies there seems, in the opinion of the community, to be no local necessity nor desire for rating or inclusion in the list.

The rules under which a community is included in this list are as follows:

1. All ratings must be determined by the State milk-sanitation authority in accordance with the Public Health Service rating method [1] based upon the grade A pasteurized milk and the grade A raw milk requirements of the Public Health Service Milk Ordinance and Code. A recent departure from the method described consists of computing the pasteurized milk rating by weighting the plant rating twice as much as the rating of the raw milk for pasteurization.

2. No community will be included in the list unless both its pasteurized milk and its raw milk ratings are 90 percent or more. Communities in which only raw milk is sold will be included if the raw milk rating is 90 percent or more.

3. The rating used will be the latest rating submitted to the Public Health Service, but no rating will be used which is more than 2 years old. In order to promote continuous rigid enforcement rather than occasional "clean-up campaigns" it is suggested that when the rating of a community on the list falls below 90 percent no resurvey be made for at least 6 months, resulting in removal from the next semiannual list.

4. The Public Health Service will make occasional check surveys of cities for which ratings of 90 percent or more have been reported by the State. If such check rating is less than 90 percent but not less than 85, the city will be removed from the 90 percent list after 6 months unless a resurvey submitted by the State during this probationary interim shows a rating of 90 percent or more. If, however, such check rating is less than 85 percent, the city will be removed from the list immediately. If the check rating is 90 percent or more, the city will be retained on the list for a period of 2 years from the date of the check survey unless a subsequent rating submitted during this period warrants its removal.

Communities which are now on the list should not permit their ratings to lapse, as ratings more than 2 years old cannot be used.

State milk-sanitation authorities who are not now equipped to determine municipal ratings are urged, in fairness to their communities, to equip themselves as soon as possible. The personnel required is small; in most States one milk specialist is sufficient for this work.

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[1] Pub. Health Rep. 53: 1386 (1938). Reprint No. 1970.

CDC Laboratory Courses Revised

The 1950 schedule of public health laboratory courses given by the Communicable Disease Center has been revised as follows:

An additional 1-week course in laboratory diagnosis of enteric diseases, introductory enteric bacteriology, will be given March 20–24.

An additional 2-week course in laboratory diagnosis of tuberculosis will be given December 4–15.

The previously announced 3-week course in the laboratory diagnosis of tuberculosis will be given August 21–September 7, instead of the dates shown on the course announcement on page 41 of the Bulletin of Public Health Laboratory Courses.

An additional 1-week course in serological diagnosis of rickettsial diseases will be given November 6–10.

Information and application forms should be requested from the Chief, Laboratory Services, Communicable Disease Center, Public Health Service, Chamblee, Georgia.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JANUARY 21, 1950

For the current week, the health of the Nation was good as reflected by reported cases of major communicable diseases. Decreases are noted in diphtheria (from 205 to 149), measles (from 4,946 to 4,329), and poliomyelitis (from 123 to 117). Increases are noted in pneumonia (from 2,262 to 2,274), influenza (from 4,325 to 4,563), meningococcal meningitis (from 94 to 106), scarlet fever (from 1,425 to 1,649) typhoid and paratyphoid fever (from 38 to 43), whooping cough (from 2,159 to 2,192), infectious encephalitis (from 9 to 13), and tularemia (from 27 to 32).

Michigan reported a decrease in cases of measles from the preceding week (from 1,336 to 910). Increases in reported cases of measles are noted in New York (from 258 to 329), West Virginia (from 91 to 185), and Delaware (from 24 to 115).

Influenza reported cases increased from 389 to 558 in Virginia and from 8 to 65 in Idaho. Hawaii reported 414 cases of influenza. California reported an increase in scarlet fever from 79 cases last week to 138 for the current week.

Increases in whooping cough are noted in Arkansas (from 5 to 49) and Texas (from 84 to 128).

One case of smallpox was reported in each of three States, Nebraska, New Mexico and Colorado. Tennessee reported one case of rabies in man.

Of 46 States and the District of Columbia reporting on rabies in animals, for 23 and the District of Columbia, there were no cases. The remaining 23 States reported 135 cases with the largest numbers in Texas (23), Kentucky (17), New York, Ohio, and Indiana (with 14 cases each).

A total of 9,493 deaths was recorded during the week in 93 large cities in the United States, as compared with 9,842 last week; 9,832 and 10,231, respectively, the corresponding weeks of 1949 and 1948; and 9,949 for the 3-year (1947–49) median. For the year to date the total is 28,996 as compared with 30,388 for the same period last year. Infant deaths for the current week totaled 597; for last week 603; for the corresponding week last year 679; and for the 3-year median, 723. The cumulative figure is 1,847 as compared with 2,091 for the same period last year.

Telegraphic case reports from State health officers for week ended January 21, 1950

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	----	----	----	41	1	5	----	----	11	----	----	----	29	----
New Hampshire	----	----	----	----	----	2	----	----	2	----	----	----	6	----
Vermont	----	----	----	5	----	----	----	----	6	----	----	----	27	----
Massachusetts	5	----	----	74	2	----	----	----	94	----	----	1	112	----
Rhode Island	----	----	1	2	1	2	----	----	10	----	----	----	11	----
Connecticut	----	----	----	24	----	48	1	----	17	----	----	----	116	----
MIDDLE ATLANTIC														
New York	18	1	[1] 1	329	6	313	5	----	[2] 113	----	----	2	241	14
New Jersey	----	----	----	439	2	113	1	----	33	----	----	1	176	----
Pennsylvania	5	----	----	136	6	102	3	----	120	----	----	2	202	2
EAST NORTH CENTRAL														
Ohio	6	----	1	92	6	47	1	----	195	----	----	2	147	14
Indiana	3	----	20	34	----	9	3	----	41	----	1	3	8	14
Illinois	2	2	2	90	6	82	7	----	53	----	7	4	81	1
Michigan	----	----	----	910	6	46	10	----	145	----	----	2	220	3
Wisconsin	----	----	25	164	3	17	1	----	87	----	----	----	91	1
WEST NORTH CENTRAL														
Minnesota	2	----	----	48	1	10	3	----	21	----	----	----	24	----
Iowa	1	----	1	172	1	3	5	----	19	----	----	----	5	3
Missouri	6	----	4	2	2	21	2	----	6	----	----	1	16	----
North Dakota	1	----	----	39	----	----	1	----	2	----	----	----	1	----
South Dakota	----	1	----	9	1	2	----	----	7	----	----	----	5	----
Nebraska	2	----	51	85	----	----	3	----	26	1	----	----	10	----
Kansas	----	1	2	11	----	25	----	----	38	----	2	4	11	----
SOUTH ATLANTIC														
Delaware	----	----	----	115	----	----	----	----	4	----	----	----	1	----
Maryland	8	----	----	47	1	33	1	----	21	----	1	----	77	----
District of Columbia	----	----	----	42	----	16	----	----	4	----	----	----	----	----
Virginia	2	----	558	18	4	126	1	----	20	----	2	1	12	2
West Virginia	2	----	29	185	6	19	----	----	27	----	2	----	33	8
North Carolina	4	----	----	128	2	----	1	----	68	----	1	1	59	----
South Carolina	3	----	43	176	3	8	1	----	2	----	----	1	2	4
Georgia	6	----	314	17	1	17	1	----	16	----	4	1	4	4
Florida	----	----	15	7	1	21	1	----	5	----	----	2	1	5

EAST SOUTH CENTRAL														
Kentucky	7	------	------	16	8	26	2	------	52	------	1	1	26	17
Tennessee	6	------	26	------	10	54	2	------	20	------	------	2	28	5
Alabama	9	------	98	35	------	38	1	------	16	------	1	1	11	5
Mississippi	3	------	29	30	------	35	------	------	8	------	------	1	1	3
WEST SOUTH CENTRAL														
Arkansas	3	1	153	3	------	50	1	------	2	------	5	1	49	1
Louisiana	4	------	------	14	3	39	2	------	3	------	------	4	3	------
Oklahoma	2	------	135	6	------	89	2	------	19	------	4	1	8	1
Texas	24	3	2, 660	98	4	639	20	------	33	------	1	1	128	23
MOUNTAIN														
Montana	------	------	15	67	------	------	------	------	23	------	------	------	------	------
Idaho	1	1	65	13	1	35	1	------	10	------	------	------	------	------
Wyoming	------	------	------	4	1	2	1	------	2	------	------	------	------	------
Colorado	1	------	41	58	2	44	3	------	14	1	------	------	19	3
New Mexico	------	------	1	52	------	18	------	------	11	1	------	------	4	------
Arizona	------	1	257	125	3	33	3	------	9	------	------	2	24	1
Utah	1	------	------	199	------	3	1	------	7	------	------	------	14	------
Nevada	1	------	------	1	------	3	1	------	------	------	------	------	------	------
PACIFIC														
Washington	------	------	------	32	------	2	1	------	39	------	------	------	17	------
Oregon	2	------	8	17	4	32	5	------	30	------	------	------	30	------
California	9	2	8	118	8	45	19	------	138	------	------	1	102	1
Total	149	13	4, 563	4, 329	106	2, 274	117	------	1, 649	3	32	43	2, 192	135
Median, 1945–49	282	7	4, 585	5, 490	100	------	51	------	2, 711	5	35	46	2, 418	------
Year to date, 3 weeks	[3] 520	35	12, 965	12, 319	273	6, 746	364	4	4, 306	5	83	105	6, 011	383
Median, 1945–49	988	20	12, 807	13, 573	266	------	162	1	7, 210	13	119	127	6, 526	------
Seasonal low week ends	(27th) July 9	------	(30th) July 30	(35th) Sept. 3	(37th) Sept. 17	------	(11th) Mar. 19	------	(32d) Aug. 13	(35th) Sept. 3	------	(11th) Mar. 19	(39th) Oct. 1	------
Since seasonal low week	[3] 4, 791	------	43, 495	31, 449	1, 186	------	[3] 41, 843	------	20, 745	12	------	3, 262	27, 547	------
Median, 1944–45 to 1948–49	8, 554	------	49, 077	39, 697	1, 238	------	19, 120	------	33, 530	67	------	3, 655	30, 919	------

---

[1] New York City only.
[2] Including cases reported as streptococcal sore throat.
[3] Figures changed by later reports.

Alaska: Measles 24, pneumonia 2.
Hawaii: Influenza 414, measles 4, scarlet fever 1.

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended December 31, 1949—During the week ended December 31, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New-Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox			17		118	385	56	46	61	42	725
Diphtheria					2	3			1		6
Dysentery, bacillary					2	1				10	13
German measles			3		1	64		4	76	10	158
Influenza			6				5				11
Measles			27	19	149	602	90	87	64	121	1,159
Meningitis, meningococcal			1								1
Mumps			18		2	522	2	13	33	73	663
Poliomyelitis					1	1	1		1		4
Scarlet fever	9			4	45	57	12	2	55	6	190
Tuberculosis (all forms)	6		2	7	55	19	29	7	19	40	184
Typhoid and paratyphoid fever						1					1
Undulant fever					1	1	2				4
Venereal diseases:											
Gonorrhea	4		7	19	49	51	25	8	28	74	265
Syphilis	3		1	11	39	18	10	2	2	9	95
Other forms										1	1
Whooping cough			2		23	41	1			10	77

NORWAY

Notifiable diseases—October 1949.—During the month of October 1949, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	5	Mumps	159
Diphtheria	17	Paratyphoid fever	3
Encephalitis, epidemic	8	Pneumonia (all forms)	2,239
Erysipelas	412	Poliomyelitis	20
Gastroenteritis	2,852	Rheumatic fever	87
Gonorrhea	293	Scabies	1,956
Hepatitis, epidemic	107	Scarlet fever	420
Impetigo contagiosa	2,945	Syphilis	89
Influenza	2,844	Tuberculosis (all forms)	394
Laryngitis	11,083	Typhoid fever	2
Malaria	1	Weil's disease	6
Measles	1,120	Whooping cough	5,386

SWITZERLAND

Notifiable diseases—July–September 1949.—During the months of July, August, and September 1949, cases of certain notifiable diseases were reported in Switzerland as follows:

Disease	July	August	September
Cerebrospinal meningitis	6	5	6
Chickenpox	169	150	158
Diphtheria	72	110	90
Dysentery	----------	5	19
Hepatitis, epidemic	38	43	52
Influenza	----------	2	3
Measles	554	252	246
Mumps	130	151	177
Paratyphoid fever	9	26	15
Poliomyelitis	49	113	164
Scarlet fever	339	417	434
Tuberculosis	316	315	222
Typhoid fever	6	19	11
Undulant fever	14	18	13
Whooping cough	431	405	281

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—Calcutta and Negapatam—During the week ended January 7, 1950, 44 cases of cholera, with 18 deaths were reported in Calcutta, and 5 cases with 3 deaths were reported in Negapatam.

Plague

Ecuador—Loja Province—During the month of December 1949, 6 cases of plague, one fatal, were reported at Sozoranga, Macara County, and one case was reported at Paltaguayco, Celica County.

Smallpox

Burma—During the week ended January 7, 1950, 89 cases of smallpox, with 29 deaths were reported in Burma.

India—Calcutta—Cawnpore—During the week ended January 14, 1950, 127 cases of smallpox were reported in Calcutta. This city was reported to be infected with smallpox in epidemic form on January 7. During the week ended January 7, 46 cases of smallpox, with 10 deaths were reported in Cawnpore.

Mexico—Jalisco—On January 24, 1950, an outbreak of black smallpox was reported in Jalisco. Six cases were confirmed in Jamay and Valle de Juarez by the Public Health office. It is believed to be serious in the neighboring state of Michoacan and measures have been taken to prevent the spread of this epidemic.

Arabia—Jedda and Mecca—During the week ended January 7, 1950, 61 cases of smallpox were recorded in Jedda, and 4 fatal cases were reported in Mecca.

Yellow Fever

Africa—Sierra Leone—On December 13, 1949, one case of yellow fever was reported in Koinadugu District and confirmed by laboratory test. This case was reported earlier as suspected.

DEATHS DURING WEEK ENDED JAN. 21, 1950

	Week ended Jan. 21, 1950	Corresponding week, 1949
Data for 93 large cities of the United States:		
Total deaths	9,493	9,832
Median for 3 prior years	9,949	
Total deaths, first 3 weeks of year	28,996	30,388
Deaths under 1 year of age	597	679
Median for 3 prior years	723	
Deaths under 1 year of age, first 3 weeks of year	1,847	2,091
Data from industrial insurance companies:		
Policies in force	69,826,193	70,650,802
Number of death claims	14,640	13,338
Death claims per 1,000 policies in force, annual rate	10.9	9.8
Death claims per 1,000 policies, first 3 weeks of year, annual rate	9.7	9.4

Correction

In the article "Studies of the Action of Sodium Fluoride on Human Enamel by Electron Microscopy and Electron Diffraction," published in the January 13, 1950, issue of the Public Health Reports, the legend accompanying the illustration, figure 13 on page 54, will be correct if the figure is transposed. Due to a typographical error, the illustration was inserted incorrectly.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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PUBLIC HEALTH SERVICE

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Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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Public Health Reports

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Promacetin in Treatment of Leprosy

—Progress Report—

By Frederick A. Johansen, M. D.,† Paul T. Erickson, M. D., Rolla R. Wolcott, M. D., William H. Meyer, M. D., Herman H. Gray, M. D., B. M. Prejean, D. D. S., and Sister Hilary Ross, B. S.*

The value of promin, diasone, and sulfetrone in the treatment of leprosy has been reported previously in the medical literature (*1*, *2*, *3*). Although any one of these drugs at present might be termed the treatment of choice, the need for more rapidly acting remedies is demonstrated by their exceedingly slow action in effecting a disappearance of the leprosy bacillus from active lesions (*4*). Furthermore, although these sulfone derivatives are of comparatively low toxicity, they cannot be considered entirely innocuous. Constant medical supervision and periodic laboratory tests are required because of certain toxic manifestations.

Search for a drug of the lowest possible degree of toxicity and of the highest possible therapeutic efficiency in leprosy led to the present clinical evaluation of promacetin.[1] This drug, at one time referred to as Internal Antiseptic 307, is a sulfone closely related chemically to promin, diasone, and sulfetrone, and has been reported to be of relatively low toxicity (*5*). The explanation for its low toxicity, perhaps, lies in the evidence that it does not break down into diaminodiphenylsulfone. Diaminodiphenylsulfone, the parent substance of promin, diasone, sulfetrone, and promacetin, in comparable doses is a much more toxic product than any one of these derivatives. It is believed, therefore, that the degree of toxicity of the sulfone drugs depends upon the extent to which they break down in the human body into diaminodiphenylsulfone. Also, for promacetin, studies indicated that even with massive doses by mouth the blood level of the drug will seldom attain dangerous proportions. These features of promacetin together with evidence (*1*) collected at Carville in 1943 that it has antileprotic properties on oral administration, even in comparatively small doses, made a further clinical trial of its possibilities in the treatment of leprosy particularly inviting.

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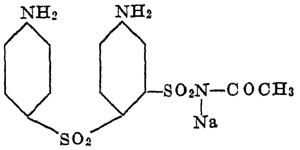
†Medical Officer in Charge.

*United States Marine Hospital (National Leprosarium), Carville, La.

[1] The drug for this experimental study was supplied by Parke, Davis, and Company, the manufacturers, through Dr. Eugene H. Payne, whose interest stimulated this further investigation.

Promacetin is sodium 4,4′-diaminodiphenylsulfone-2 acetylsulfonamide. It is a white crystalline compound soluble up to 3 percent in water at room temperature. Its structural formula is as follows:



The therapeutic effectiveness of promacetin compares favorably with sulfapyridine, sulfathiazole, and sulfadiazine in *Streptococcus hemolyticus*, *S. viridans* and *S. pneumoniae* septicemia in mice. Favorable clinical response has been reported in its use for pneumococcus pneumonia in man. Oddly enough, in view of its apparent effectiveness in the acid fast infection of leprosy in humans, it gives no protection against tuberculosis in guinea pigs (*6*). Adequate clinical trial in human tuberculosis has not been reported.

Clinical Material

The clinical material for this preliminary evaluation of promacetin included 27 patients—26 of the lepromatous, and 1 of the tuberculoid type (table 1). Most of the patients were either moderately or far advanced with unfavorable prognoses and, therefore, exceptionally desirable material for treatment evaluation.

Seventeen patients had received no previous treatment for leprosy, two had received chaulmoogra oil, and eight, sulfones. Of the two patients previously treated with chaulmoogra oil, one had not received any treatment for a period of 11 years and presented nodules and heavy diffuse infiltration; the other had not received treatment for 3 years and likewise showed far advanced manifestations, including extensive confluent nodulation with ulceration. Six patients previously treated with sulfones (promin or diasone) showed only residual

Table 1. *Classification of clinical material on type of disease, type of lesions, and previous treatment*

Previous treatment	Lepromatous			Tuberculoid	Total
	Nodules, macules and diffuse infiltration	Macules and diffuse infiltration	Residual		
None	10	6	0	1	17
Chaulmoogra oil	2	0	0	0	2
Sulfones	2	0	6	0	8
Total	14	6	6	1	27

lesions and were included in the study because, in spite of marked clinical improvement on sulfones, all continued to show after several years of treatment a significant number of leprosy bacilli in the skin scrapings. The intention was to determine the effect promacetin might have in the further reduction of the number of bacilli in the skin of these patients. The remaining two sulfone-treated patients showed active leprous skin lesions consisting of nodules, macules, and diffuse infiltration. One of these represented a clinical relapse; the other, who in addition showed extensive nodular infiltration of the mucous membrane of the palate, tongue and pharynx, represented a clinical progression of the disease several years after the patient had left the hospital and discontinued all treatment against medical advice.

Table 1 further sets forth the type of lesions the patients presented before treatment. Extensive heavy diffuse infiltration, nodules and macules of the skin of the lepromatous type with numerous (4+) or a moderate (3+) number of bacilli present occurred in 13 patients. Moderate diffuse infiltration with associated infiltrated macules showing either numerous, a moderate number, or few (2+) bacilli present occurred in 7 patients. Residual lesions presenting a variable (4+ to 1+ rare) number of bacilli were seen in 6 of the patients previously treated with sulfones, while 2 showed active fresh lesions as already described. The tuberculoid type patient showed plaques and patches of various sizes devoid of bacilli, and a positive lepromin test. All patients, except those showing only residual lesions and the tuberculoid type patient, had extensive involvement of the nasal mucous membrane, and one had involvement of the entire mouth, nasopharynx, and larynx.

Methods

Since it is known that the drugs so far found to be effective in leprosy must be administered over a long period of time, the dosage of promacetin was kept comparatively low during the early stages of treatment. Although promacetin has been reported to be of low toxicity when given for short periods of time, it was felt that in this group of patients, where treatment of long duration was contemplated, chances could not be taken with initial large doses. Consequently, the initial daily oral dose of promacetin varied from .3 to .5 gm. except for a small number of male patients of good physique who were given an initial daily oral dose of 1.5 gm. Where the initial dose was .3 to .5 gm. the dosage was increased by .3 to .5 gm. every 2 weeks until a total daily dose of 1.5 gm. was reached. Then the dosage was increased by either 1.0 gm. or 1.5 gm. up to a maximum of from 3.0 to 4.0 gm. daily. For those patients who were begun on 1.5 gm. daily the dosage was increased by either 1.0 gm. or 1.5 gm. every 2 weeks until the maximum of from 3.0 to 4.0 gm. was reached.

Promacetin was administered at meal time as has been customary at Carville with all other orally administered sulfones. Similarly, rest periods, during which the drug was withheld, were observed at the same intervals by the promacetin group of patients as those observed routinely by all other patients taking orally administered sulfones. The rest periods were observed for 15 days during the latter part of March, July, September, and December.

Careful initial clinical and laboratory examinations were conducted and clinical photographs taken. For follow-up, a weekly clinical examination was done and clinical photographs taken whenever sufficient improvement had occurred in the skin lesions to make it possible to record such improvement photographically. An erythrocyte and a leucocyte count, hemoglobin determination, and a urinalysis were done on each patient every 3 weeks. Blood and urine levels for promacetin, and skin and nasal scrapings were performed periodically.

Among patients treated with promin, diasone, and sulfetrone at this institution, it is routine practice to administer iron and vitamin therapy when there is only a slight drop in the erythrocyte count, since it is known that there is a tendency on the part of these drugs to produce anemia. In the promacetin group of patients, iron and vitamin therapy, as well as liver and gastric mucosal preparations, were withheld unless the patient presented an initial anemia or showed a persistent decrease in the erythrocyte count during treatment. Such a procedure was necessary in order to determine the actual effect of promacetin on the peripheral blood elements. Three patients inadvertently, however, were given blood boosting preparations during insignificant decreases in their erythrocyte counts which were well within the realm of laboratory variation.

This drug evaluation began on March 1, 1948, and data were collected for the purposes of this report up to July 31, 1949.

Toxicity and Other Complications

Among this group of 27 patients there occurred no severe acute toxic symptoms. Eleven patients had minor complaints of a transitory character occurring either during the first few days of treatment or when the dose of promacetin was increased. Headache, lethargy, and drowsiness occurred in four patients; dizziness in three patients; anorexia and gastric distress in seven; and temporary tinnitus in one (table 2). Drug fever did not occur. None of the listed symptoms required suspension of treatment and interfered little, if any, with the regular administration of the drug. Sodium bicarbonate taken with the promacetin relieved anorexia and gastric distress.

In regard to chronic toxic manifestations all patients were closely

Table 2. *Minor transitory acute toxic symptoms occurring in 11 patients*

Symptoms	Number of patients	Percent	Symptoms	Number of patients	Percent
Headache	4	15	Anorexia and gastric distress	7	26
Dizziness	3	11	Tinnitus	1	4
Lethargy and drowsiness	4	15			

watched especially for anemia, dermatitis, and kidney and liver injury. There was no clinical or laboratory evidence of kidney or liver damage, or of dermatitis.

Initial erythrocyte counts performed prior to treatment with promacetin indicated the need for immediate antianemic therapy in six patients. Since antianemic therapy was begun and maintained, this eliminated any further consideration of these patients in respect to their erythrocytes except that it should be mentioned that their counts gradually rose to normal during active treatment with promacetin. Among two-thirds of the remaining patients (14 out of 21), a slight depression of erythrocyte counts was noted in the first 2 to 4 weeks of treatment. Antianemic therapy in the form of iron and vitamins was given to four of these patients, but withheld from the remainder. With but three exceptions, the patients who received no antianemic therapy returned as rapidly to their original level of erythrocytes as those who were given antianemic therapy. The clinical course of the disease in these three patients was altered by the development of lepra reactions associated with high fever. These reactions occurred approximately 3 months after inception of treatment, and at the time when a secondary rise in the erythrocyte level had begun. Two of these patients gave a history of similar lepra reactions with severe anemia prior to treatment, making it quite certain that these eposides in at least two of the patients were unrelated to the administration of promacetin. Erythrocyte counts of these patients returned to normal after the subsidence of the reactions with the administration of iron salts, vitamins, and liver extract. A summary of the erythrocyte count behavior follows with the symbol "AT" denoting the administration of antianemic therapy:

Decrease less than 0.5 million per cu. mm	5 patients (3 AT)
Decrease between 0.5 and 1.0 million per cu. mm	5 patients (1 AT)
Decrease between 1.0 and 1.5 million per cu. mm	4 patients (3 AT)
No change in erythrocytes	2 patients
Increase less than 0.5 million per cu. mm	4 patients
Increase between 0.5 and 1.0 million per cu. mm	1 patient

Leucopenia was not observed in any of the patients treated. Leucocytosis occurred with the same frequency as would be normally expected in moderately or far advanced leprosy. Mild erythema nodosum occurred in 11 patients. Six of these patients had experienced such reactions prior to treatment with promacetin. Three patients developed lepra reactions during which there was a temporary exacerbation of specific leprous lesions. Two of these patients had experienced similar reactions prior to treatment with promacetin.

One patient who had had frequent previous attacks of iridocyclitis had repeated exacerbations of this condition. Pain from leprous neuritis, although not a common complaint in this group of patients, did persist in a mild form in some patients.

There were six patients altogether in whom treatment was discontinued, but in none of these could the reason for discontinuation of treatment be wholly attributable to promacetin. The reasons were as follows: refusal of patient to cooperate because of psychotic episode unrelated to the drug, 1; irregular discharges (two improved nodular cases, one showing no change), 3; and acute lepra reactions, 2.

Therapeutic Effect

The evaluation of the therapeutic effect of promacetin on leprous skin and mucous membrane lesions was primarily confined to the 21 patients listed in table 1 as having clinically active lesions when treatment was begun. The patients are referred to as group I. Those patients, six in number, who presented clinically inactive or residual lesions are utilized mainly in this report for a demonstration of bacteriologic response. These patients are referred to as group II.

Group I patients were treated for periods varying from 4 to 16 months and received a total of 13,811 gm. of promacetin. The total amount for each patient averaged 658 gm. The total amount of the drug taken by each patient may be found in the summary of cases (table 3).

Early objective improvement in specific skin lesions, as well as in secondary infected skin ulcerations, occurred in all of these patients. The duration of treatment before objective clinical improvement could be detected by careful physical examination varied from 2 to 8 weeks. The earliest change noted was a change in color in the form of a fading or tanning of macules and of the diffusely infiltrated areas of skin. This change usually became evident after about 2 to 4 weeks of treatment. At the same time there was a decrease in the edema of the dermal tissues associated with softening of the skin over the areas of diffuse infiltration and a decrease in the turgidity of the nodules. Definite shrinking of the nodules and decrease in infiltration of the skin did not occur until after at least 1 to 2 months of treatment. Necrosis of nodules before actual decrease in size took place was observed in some patients. Necrosis was followed by ulceration and crusting which rapidly healed. If swelling of the hands and feet were present, this manifestation also responded early and readily.

Mucous membrane lesions of the nose, mouth, and throat showed the effects of early healing in relief obtained from nasal obstruction and hoarseness during the first few weeks of treatment. Objective evidence of healing was observed by the workers in the eye, ear, nose, and throat, and dental departments. The dental officer gave the opinion that promacetin accomplished the healing of active mucous membrane lesions of the mouth and throat more rapidly than that observed from other sulfones.

Objectively, clinical improvement was progressive throughout the interval of treatment except in one patient. This patient (No. 1959), whose major skin manifestation was a number of infiltrated lepromatous patches, showed initial improvement which was followed by a temporary outburst of many small erythematous patches. After these lesions subsided, another exacerbation of lesions occurred after 6 months of treatment over larger areas of the body associated with fever, hoarseness, and nasal obstruction typical of an acute lepra reaction. Promacetin was discontinued. After remaining in a reactive stage for about 4 months this patient improved slowly and the skin and mucous membrane became negative for leprosy bacilli. Although there was eventual improvement in this patient he is classified in the summary as in worse condition at the end of the treatment interval than he was when treatment was begun. Another patient (No. 1942) developed a severe lepra reaction during which there was a temporary increase in the diffuse infiltration associated with high fever, neuritis, and secondary anemia. Promacetin was discontinued because of a continued reaction state and a refractory type of secondary anemia.

Among the patients treated was a psychotic one (No. 1372) who for a period of about 10 months had a remission from the mental disturbance. This patient presented far advanced confluent nodular skin lesions with very heavy diffuse infiltration and, during the remission of the mental state, promacetin was given and taken orally without much difficulty. Improvements in the specific lesions were rapid. By the time the nodules had flattened there was an exacerbation of the mental condition and all medication was refused. Four months later there was a definite return of infiltration and nodulation.

The patient having leprosy of the tuberculoid type (No. 1953) improved markedly and rapidly. This improvement cannot be attributed to promacetin entirely as tuberculoid leprosy generally improves spontaneously. The rapidity with which the lesions regressed in this case, however, suggests an added factor.

Another observation of interest denoting clinical improvement in the skin of some patients was regrowth of hair after about 6 months of treatment. The regrowth was scanty but nevertheless present. It appeared in eyebrow regions where eyebrows had been absent

Table 3. *Summary of cases*

Patient No.	Age	Sex	Type of leprosy	Type of skin* lesion	Initial smears		Duration of treatment	Maximum daily dose (gm.)	Total amount drug (gm.)	First skin improvement noted	Condition skin end of treatment interval	Last smears		Final disposition
					Skin	Nasal						Skin	Nasal	
							Months			*Weeks*				
1920	31	M	L_2N	N and DI	3+	4+	16	4.0	1,255	2	Marked improvement	1+	1+	Treatment continued.
1931	23	M	L_3N	N, DI, M	4+	3+	14.5	4.0	1,054	8	do	2+	0	Do.
1932	25	F	L_2N_2	N, DI, M	4+	2+	14.5	3.0	883	3	do	4+	0	Do.
1372	(?)	F	L_3	N, DI	4+	4+	12	3.0	441	6	do	4+	4+	Discontinued.
1964	35	F	L_2N	N, DI	3+	3+	12	3.0	613	4	Moderate improvement	1+	0	Treatment continued.
1974	57	M	L_2N	N, DI	4+	4+	11	4.0	776	4	do	2+	0	Do.
1966	55	M	L_3	N and DI	4+	4+	12	4.0	1,090	4	Marked improvement	4+	1+	Do.
1960	38	M	L_2	N, DI, M	3+	3+	11	4.0	1,053	4	do	3+	(?)	Absconded.
1956	42	M	L_2N	N, DI, M	4+	4+	7	3.0	253	4	Slight improvement	4+	(?)	Do.
2010	38	M	L_2N	N, DI, M	3+	2+	4	3.0	256	3	do	3+	1+	Treatment continued.
1949	51	M	L_2N_2	N. DI, M	4+	4+	12.7	3.0	781	2	Moderate improvement	2+	0	Do.
1993	35	M	L_2N_2	N, DI, M	3+	2+	6.5	2.0	300	2	Slight improvement	4+	2+	Do.
2009	65	F	L_3N	N, DI	4+	3+	4.3	1.5	175	5	do	4+	1+	Do.
1942	42	F	L_1N	M and DI	2+	4+	10	3.0	382	2	Moderate improvement	1+	0	Discontinued.
1959	60	M	L_1	M	2+	0	9	4.0	758	4	Worse	0	0	Do.
1951	24	M	L_1	M	4+	4+	13.5	4.0	1,211	3	Marked improvement	3+	1+	Treatment continued.
1953	44	M	T	Plaques	0	0	13.5	4.0	911	3	do	0	0	Do.
1955	15	M	L_1	M	2+	1+	13	4.0	1,042	2	do	2+	0	Do.
1992	49	F	L_3N_2	N, DI, M	4+	4+	7	2.0	163	6	Moderate improvement	4+	0	Do.
2002	51	F	L_1N_2	M, DI	2+	4+	4.3	3.0	275	3	Slight improvement	1+	0	Do.
2012	25(?)	F	L_1N_3	M, DI	1+	2+	4.5	2.0	139	4	do	2+	0	Do.
1695	48	F	L_3N	Residual	4+	0	15.5	3.5	924		Renewed clearing	1+	0	Do.
1947	45	M	L_2	Residual	3+	0	3	1.5	118		No change	3+	0	Absconded.
1759	30	F	L_1N_1	Residual	1+	0	14	1.0	113		do	1+	0	Treatment continued.
796	55	M	L_3N_3	Residual	4+	1+	15	1.0	276		Renewed clearing	2+	0	Do.
1902	38	M	L_2N	Residual	1+	0	13	3.0	728		do	0	0	Do.
1957	31	F	L_2	Residual	3+	1+	12	2.5	454		do	1+	0	Do.

*N—Nodules. *DI—Diffuse infiltration. *M—Infiltrated macules.

prior to treatment and on the extremities and chest. Subjective improvement in the sensation of the extremities took place in some patients.

Reduction in the number of leprosy bacilli in the skin did not become noticeable in skin smears until after 1 year's treatment. A few heavy nodular cases continued to show the same number of organisms in the skin smears although the absolute number of organisms must have been significantly reduced by the decrease in size of the lesions. The mucous membranes showed a reduction in bacilli at an earlier stage and many patients showed negative nasal smears at the end of 1 year's treatment.

Group II patients, presenting only residual lesions, were treated for periods varying from 3 to 15 months. They received a total of 2,613 gm. of promacetin or an average of 435 gm. per patient. Actual amounts given to each patient may be found in the summary of cases (table 3).

Table 4. *Clinical status of patients (group I) at end of treatment interval*

Treatment period	Clinical status				
	Marked improvement	Moderate improvement	Slight improvement	Worse	Total
Number patients treated 12 months or more	8	2			10
Number patients treated 6 months–12 months	1	3	2	1	7
Number patients treated 3 months–6 months			4		4
Total	9 (43%)	5 (24%)	6 (28%)	1 (5%)	21

Group II patients were expected to show little if any change in their skin manifestations. Four of these patients surprisingly, however, began to show renewed clearing of their skin after 3 to 6 months' treatment. One patient left the hospital without permission after 3 months' treatment, and the sixth patient (No. 1759), because of repeated lepra reactions which she also had prior to promacetin treatment, received only interrupted treatment in small doses to the extent of 113 gm. in 14 months. These two patients showed no change

Table 5. *Bacteriologic status of patients at end of treatment interval*

Treatment period	Bacteriologic status					
	No change		Reduction in bacilli		Negative	
	Skin	Nasal	Skin	Nasal	Skin	Nasal
Number patients treated 12 months or more	4(1)	1	5(3)	3	(1)	4(2)
Number patients treated 6 months–12 months	4	1	2	0	1	3
Number patients treated 3 months–6 months	3(1)	0	1	2	0	2

Numbers in parentheses represent group II patients (residual lesions); plain numbers, group I. Discrepancy in number is accounted for by omission of those patients who had negative skin smears or nasal smears at beginning of treatment and remained negative.

in the skin, but the repeated lepra reaction experienced by one of them gradually abated.

There was a reduction in the number of leprosy bacilli in the skin of all of these patients who showed renewed clearing of the skin, and one became negative. While two had positive nasal smears at the inception of treatment, all of them had negative nasal smears at the end of the treatment interval.

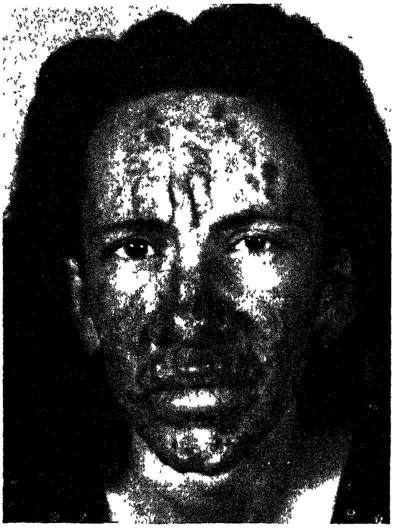
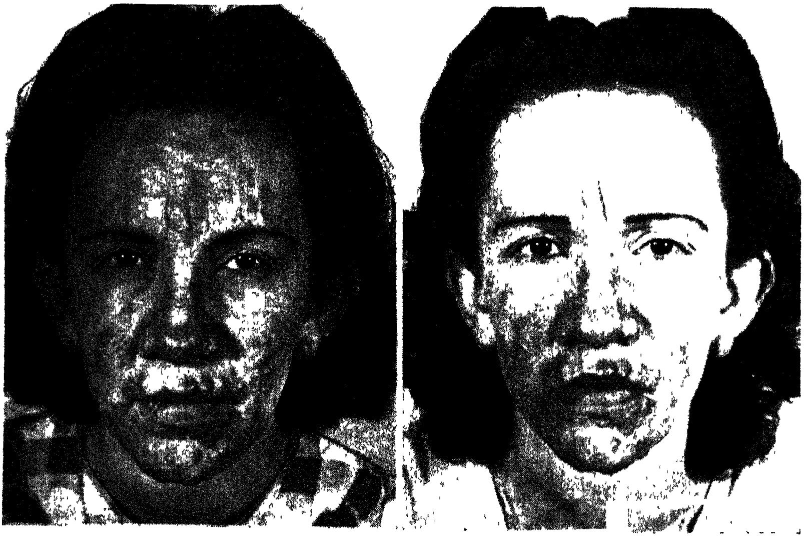


Figure 1.
Photographs showing
response to treatment
of extensive
nodulation of skin.

Before treatment

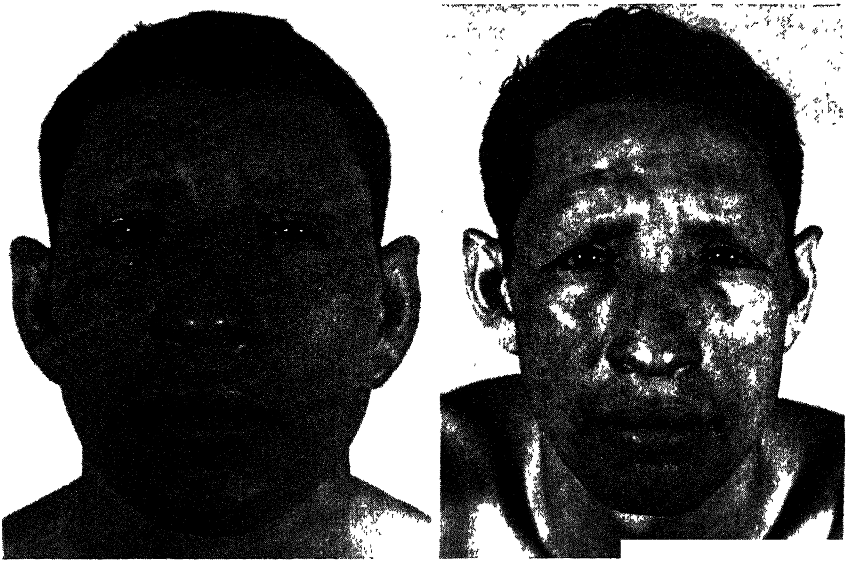


5 months' treatment

12 months' treatment

The clinical condition of group I patients at the end of their treatment interval is classified in table 4. Status in regard to the bacterioscopic condition of skin and mucous membranes of both groups of patients is given in table 5.

Clinical photographs of representative cases serve further to illustrate the effect of promacetin on leprous lesions (figs. 1 and 2).



Before treatment **4 months' treatment**

Figure 2. Photographs showing response to treatment of diffuse infiltration and small discrete nodules.

Discussion

The final status of these 27 patients at the end of their individual treatment intervals was on the whole improved. Those who had no prior sulfone treatment, in addition to objective improvement, showed the usual subjective improvement manifested by an air of well being, increase in appetite and weight gain. Those who had long periods of treatment with sulfones prior to promacetin seemed to benefit by a change in treatment as shown by the renewed clearing of their skin and by the further reduction of leprosy bacilli in their specific lesions.

The early changes in macules and infiltrations observed following treatment might be looked upon by the experienced leprologist as possibly due to the spontaneous forces of natural regression aided by rest and hospital care. This is not believed to be a tenable explanation for the improvement in all patients. The change in the various lesions was remarkably uniform in time and appearance in all patients. It was sustained as long as promacetin was administered. Withdrawal of the drug was followed by a reappearance of lesions in due time. All of these considerations point to the drug administered as the causative agent for the improvement observed.

Early improvement in infected skin ulcerations suggests that promacetin, in addition to having antileprotic properties, is capable of combating secondary infections. Relief from nasal obstruction and dryness of the throat sustained by patients taking the drug also is evidence in favor of its ability to combat ordinary infections.

It was found in the determination of promacetin blood levels that the blood level remained fairly constant between 1.5 to 2.0 mg. per 100 cc. of blood on oral doses varying from 3.0 to 4.0 gm. daily irrespective of the length of treatment. Urine levels behaved differently. In the early weeks and months of treatment the urine level on the stated dosage averaged around 25 to 50 mg. per 100 cc. of urine. After 6 to 9 months of treatment the urine levels tended to increase going as high as 200 to 250 mg. per 100 cc. of urine. Eventually, some patients excreted by way of the kidneys almost as much of the drug daily as was administered. An adequate explanation for the increase observed in the urine promacetin level after prolonged treatment while there was very little increase in the blood level of the drug cannot be given at present. After prolonged treatment significant amounts of promacetin were excreted in the urine up to 12 days following discontinuation of the drug.

The opinion expressed by some that sulfones are of no value in tuberculoid leprosy is probably influenced by the feeling that this type of leprosy is not in need of treatment. The improvement noted in the patient of this type treated with promacetin was certainly more striking and rapid than that usually observed without treatment.

Conclusions

Objective clinical improvement of skin and mucous membrane lesions of lepromatous leprosy is observed to occur following the oral administration of promacetin. The improvement noted is uniform, universal and sustained; therefore, it cannot be wholly attributed to spontaneous factors.

Reduction in the number of leprosy bacilli in the skin and mucous membrane follows clinical improvement. Skin smears commence to show a noticeable reduction of bacilli at the end of 1 year's treatment while many patients show an absence of bacilli in the mucous membrane at this time.

Promacetin is well tolerated orally even upon prolonged administration of doses as high as 3.0 to 4.0 gm. daily. Slight depression of the erythrocyte count may occur during the first few weeks of treatment. Unless there are other complications of the disease present, such depressed counts usually return to the original level spontaneously. Before it can be definitely stated that promacetin does or does not have the property of producing severe grades of anemia when used in the treatment of uncomplicated leprosy, further blood studies on a larger group of patients are necessary.

Renewed clearing after promacetin therapy of apparently stationary residual lesions in patients previously treated with sulfones suggests that a wider application should be made of alternating or combined methods of treatment in leprosy.

Promacetin apparently possesses chemotherapeutic properties against human leprosy. Its lack of protection against tuberculosis of guinea pigs and its apparent effectiveness in another acid fast infection, human leprosy, present interesting implications as to the future choice of experimental drugs for trial in both human leprosy and human tuberculosis.

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EIGHT NEW *SALMONELLA* TYPES

The eight new *Salmonella* types described here were recognized during a survey of enteric infections in Hidalgo County, Texas. The reports on the new types are presented in combined form.

Salmonella edinburg and *Salmonella san-juan*

By James Watt,* Thelma DeCapito,* P. R. Edwards,** and G. J. Hermann**

These two *Salmonella* types were isolated during the course of a study of enteric infections in Hidalgo County, Texas.

Salmonella edinburg. This type is represented by two cultures obtained by rectal swab from two children residing in Edinburg, Texas.

Two families, M. and F., were involved, and were studied with monthly records of illness and monthly stool culture examinations. Family M. consisted of the father, mother, and two children, one female, aged 3, and one male, aged 1. Family F. consisted of a mother and seven children.

The mother F. was employed by family M., and she and her children lived in a small house on the rear of the premises. There was close contact between all members of these family groups. The two families moved into the study area in May 1947. Cultures were taken from the two M. children and five youngest F. children at that time, and also in June. A few days after these cultures were taken, baby R. F., male, 1 month, became ill with a moderate diarrhea lasting about 10 days. He apparently recovered, but several days later he developed a high fever and died July 7. The diagnosis made by the family physician was pneumonia. Four days later, J. F., 3-year-old female, became ill with a diarrheal disorder. She had 10 to 15 liquid bowel movements a day, without gross blood or mucous. This diarrhea was accompanied by marked anorexia, fever, and abdominal pain. These symptoms persisted for approximately 10 days, and she was just recovering at the time of culture July 21, 1947. The stool culture was positive for *Salmonella edinburg*, both on direct plating with SS agar, and also from the tetrathionate enrichment broth plated to SS agar. No other members of the family gave a history of diarrheal disease at that time or during a 3-month follow-up period. Cultures were taken from four of the siblings at that time and during the next 3 months. No pathogens were isolated from any of these children from whom cultures were taken in August, September, and October.

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Both children in family M. became ill at about the same time that J. F. became ill. R. M., 3-year-old female, had a moderate diarrhea with from five to eight liquid stools per day for 4 days. This was accompanied by anorexia, headache, and moderate amount of abdominal pain. Her brother, 1-year-old, became sick the next day with three to four liquid stools. There was no fever or abdominal pain. Both children had completely recovered by the time of the culture July 21, 1947. *Salmonella edinburg* was isolated by the enrichment technique from the stools of R. M. No pathogen was isolated from the culture of her brother. Both were cultured on three succeeding months and did not have any additional positive cultures.

Thus, from the four individuals giving a history of illness, *Salmonella edinburg* was isolated from two. A third was not cultured until after clinical recovery was complete, and the fourth, R. F., was ill and died without having a culture taken subsequent to the onset of illness. The symptomology recorded for his fatal illness is compatible with a diagnosis of salmonellosis, but cultural evidence for such a diagnosis was not obtained. Neither of the two families involved owned any domestic animals. However, there were a number in the immediate vicinity. Cultures were taken from most of these animals during the week of August 4, but no recovery of *Salmonella edinburg* was made. No evidence as to the original source was obtained.

The cultures possessed the usual biochemical pattern of the *Salmonella* group except that both liquefied gelatin after 14 days incubation at room temperature. Glucose, arabinose, xylose, maltose, trehalose, rhamnose, sorbitol, dulcitol, inositol, and mannitol were fermented with gas production within 24 hours. Cellobiose was fermented after 8 days. Lactose, sucrose and salicin were not fermented. The cultures utilized d-tartrate, l-tartrate, mucate, and citrate, but i-tartrate was not attacked. Hydrogen sulphide was produced but indol was not formed.

The cultures were agglutinated to the titer of *S. thompson* O serum (VI, VII) and in absorption tests removed all agglutinins from the serum. The H antigens were diphasic. Phase 1 was agglutinated by, and removed all agglutinins from, *S. paratyphi B* phase 1 serum (b). Phase 2 was agglutinated by serums for all the nonspecific phases. When tested with absorbed serums for single factors two, three, five, six, and seven, it was agglutinated only by serums for three and five. In absorption tests the organism left a slight residue of agglutinins for the homologous strain in *S. thompson* phase 2 serum (1,5).

However, it removed all agglutinins for phase 2 of *S. cholerae-suis* (1,5). The antigenic formula of *S. edinburg* is VI, VII: b–1, 5.

Salmonella san-juan. This organism is represented by two cultures obtained from domestic animals cultured as a part of the study of the epidemiology of salmonellosis. The type culture was isolated from a rooster in San Juan, Texas, August 25, 1947. Twenty-four other chickens were cultured on the same premises. No pathogens were isolated from these fowl. The second isolation was made August 28 from a cat in another town about 2 miles from San Juan. Cultures were taken from 17 other animals on those premises, including 10 chickens, 4 cows, 1 dog, and 1 other cat. No *Salmonellas* were isolated from the other domestic animals.

S. san-juan, like *S. edinburg,* slowly liquefied gelatin. One culture (cat) failed to ferment inositol. Otherwise the biochemical characteristics were the same as those of *S. edinburg.*

S. san-juan also belonged to the VI, VII group and removed all agglutinins from *S. thompson* O serum. The H antigens were diphasic and phase 1 was agglutinated to titer by *S. paratyphi A* serum (a). A marked residue of agglutinins for the homologous strain remained after absorption of *S. paratyphi A* serum by phase 1 of *S. san-juan.* However, the serum no longer agglutinated phase 1 of *S. durban,* whose A antigen is somewhat different from that of *S. paratyphi A.*

Phase 2 of *S. san-juan* was agglutinated by single factor serums three and five. In absorption tests it behaved in the same way as phase 2 of *S. edinburg,* failing to clear completely the agglutinins from serum for phase 2 of *S. thompson* but removing all agglutinins for phase 2 of *S. cholerae-suis.* The antigenic formula of *S. san juan* is VI, VII:a–1,5.

Summary

S. edinburg is represented by two strains, both isolated from man. The antigenic formula is VI, VII:b–1,5. *S. san-juan,* whose antigenic formula is VI, VII:a–1,5, was isolated first from a chicken and later from a cat.

Salmonella lomita and *Salmonella riogrande*

By P. R. Edwards,* Alice B. Moran,* James Watt,** and Thelma DeCapito**

These *Salmonella* types were isolated in the laboratory of the Dysentery Control Project, Public Health Service, during the course

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of a survey of enteric infections in Hidalgo County, Texas.

Salmonella lomita. This type is represented by two cultures, one (culture 91) isolated from a cloacal swab from an apparently normal hen, the other isolated from a rectal swab taken from an apparently normal cat (culture 150). Both cultures produced H_2S, failed to form indol, and slowly liquefied gelatin. Jordan's tartrate and Simmon's citrate mediums were utilized. When tested by the method of Kauffmann and Burón (*2*), d-tartrate, mucate, and citrate were fermented but i-tartrate was not attacked. Culture 150 (cat) fermented l-tartrate while culture 91 did not utilize the substance. Acid and gas were formed within 24 hours from glucose, arabinose, xylose, rhamnose, maltose, trehalose, dulcitol, sorbitol, and mannitol. Cellobiose was fermented slowly. Lactose, sucrose, raffinose, inositol, and salicin were not fermented.

On serological examination the O antigens of the cultures were identified as VI,VII. Culture 91 was somewhat rough and the O antigens were atypical, but culture 150 removed all agglutinins from VI,VII serum in absorption tests.

The H antigens were diphasic and phase 1 was identified as e,h. Although the organisms were agglutinated to the titer of serum for phase 1 of *S. reading*, a slight residue of agglutinins for the homologous strain was left after absorption of the serum with *S. lomita.* When tested with absorbed serums for single factors 2, 3, 5, 6, and 7, the cultures were agglutinated only by serum for factor 5. When serum derived from phase 2 of *S. thompson* was absorbed by phase 2 of *S. lomita*, the titer was reduced from 10,000 to 200. The antigenic formula of *S. lomita* is VI,VII:e,h–1,5.

Salmonella riogrande. This type is represented by one culture isolated from a rectal swab culture of an apparently normal dog. The biochemical characteristics differ from those of *S. lomita* only in that inositol was fermented promptly and l-tartrate was not utilized. This type also liquefied gelatin.

The O antigens of *S. riogrande* were unlike those of any previously recognized *Salmonella* type and the organism was not agglutinated in significant dilution by any *Salmonella* O serum. When tested with serums for other groups of Enterobacteriaceae, it was agglutinated to the titer of serum for Arizona O antigen 10 (*1*). In absorption tests it left a slight residue of agglutinins for the homologous strain. Since this antigen has not appeared before in the genus *Salmonella*, it is assigned the symbol XL.

S. riogrande was diphasic and phase 1 was agglutinated to the titer of serum for phase 1 of *S. paratyphi B* (b). In absorption tests it reduced the titer of the serum from 10,000 to 500. Phase 2 was agglutinated by serums for all the nonspecific phases and by serum for single factor 5. In absorption tests it left a slight residue of agglutinins for the homologous strain in serum for phase 2 of *S. thompson*. The antigenic formula of *S. riogrande* is XL:b–1,5.

Summary

S. lomita (VI,VII:e,h–1,5) was represented by two cultures, one isolated from a cloacal swab from a normal hen, the other from a rectal swab taken from a normal cat. *S. riogrande* (XL:b–1,5) was isolated from a rectal swab from a normal dog. This type had O antigens unlike those of any previously recognized *Salmonella* but they were closely related to O antigen 10 of the Arizona group. Both types liquefied gelatin.

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Salmonella weslaco and Salmonella macallen

By P. R. Edwards,* G. J. Hermann,* James Watt,** and Thelma DeCapito**

An organism isolated in 1947 in the laboratories of the Dysentery Control Project from the rectal swab of a normal cat seemed upon preliminary examination to possess the biochemical properties characteristic of *Salmonella*. Later it was found that the culture slowly liquefied gelatin. Upon serological examination, it was found that the O and H antigens of the culture could be expressed by symbols applied to the Arizona group of paracolon bacteria by Edwards, West and Bruner (*1*). The antigenic formula of the culture was Ar. 15:17, 20. The culture differed from typical Arizona strains in that it utilized d- and l-tartrate, fermented dulcitol, and did not attack lactose. The culture remained undescribed since it was impossible to orient its antigens in the Kauffmann-White classification. Later two additional cultures of the same type were isolated, one from a rectal swab of a normal dog, and a second culture from an apparently healthy cat.

In 1948 the personnel of the Dysentery Control Project isolated three cultures which had *Salmonella* O antigens III, X and which possessed H antigens closely related to those of the strains previously isolated. These group E cultures were isolated from rectal swabs taken

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from two dogs and a cat. All the animals lived in the same vicinity, and all were apparently healthy. The relationship of these cultures to group E of the Kauffmann-White classification made it possible to orient all cultures in the genus *Salmonella*.

The first mentioned cultures, represented by the Arizona formula 15:17,20, were called *Salmonella weslaco* since the first culture was isolated in Weslaco, Texas. The cultures produced hydrogen sulfide but did not form indol. Acid and gas were formed in 24 hours from glucose, arabinose, xylose, rhamnose, maltose, trehalose, dulcitol, sorbitol, and mannitol. Cellobiose was acidified after 5 days. Lactose, sucrose, raffinose, inositol, and salicin were not fermented. Vigorous growth occurred on Simmons' citrate agar, and acid was produced in Jordan's tartrate agar. When tested by the method of Kauffmann and Burón (*2*) the organism completely utilized d-tartrate, mucate, and citrate, but did not attack i-tartrate. Two cultures utilized l-tartrate; the third did not.

As mentioned, the O and H antigens were related to those of Arizona 15:17,20. The O antigens of *S. weslaco* were identical with those of Pc 139 (Ar. 015) as shown by reciprocal absorption tests. Since these antigens were unrelated to any previously reported in *Salmonella* strains, they were assigned the symbol XLII. The H antigens of *S. weslaco* were agglutinated by single factor serums for Arizona H factors 17 and 20. Cross agglutination to the titer of the H serums occurred between *S. weslaco* and Pc 107 (Ar. 17,20). In reciprocal absorption tests each organism reduced the titer of serum derived from the other by 50 percent. The H antigens of *S. weslaco* were assigned the symbol z_{36}. Thus, it is represented by the formula XLII:z_{36}.

The group E strains were isolated in McAllen, Texas, and were called *Salmonella macallen*. Like *S. weslaco*, *S. macallen* slowly liquefied gelatin. The biochemical characteristics of *S. macallen* differed from those of *S. weslaco* only in that the former promptly fermented inositol. *S. macallen* also gave variable results in l-tartrate. The O antigens of *S. macallen* were closely related to those of *S. anatum*, and each was agglutinated to the titer of serum derived from the other. In absorption tests a slight residue was left in each serum, indicating that the two were not identical. However, *S. macallen* removed all agglutinins for *S. newington* and *S. senftenberg* from *S. anatum* O serum. Like *S. weslaco*, the H antigen of *S. macallen* was agglutinated strongly by Pc 107. The identity of the H antigens of *S. macallen* and Pc 107 was demonstrated by reciprocal absorption tests. The relations of the H antigens of *S. macallen* to those of *S. weslaco* were the same as the relations of the latter to the H antigens of Pc 107. Since the H antigens of *S. macallen* were similar to those of *S. weslaco*, and since for diagnostic purposes it was not necessary to differentiate between them, *S. macallen* was also assigned the symbol z_{36}. The antigenic formula of *S. macallen* is III, X:z_{36}.

S. weslaco is not the first *Salmonella* type which could not be oriented in the Kauffmann-White schema when first isolated. *S. cerro* had no serological relations to known *Salmonella* types and was excluded from the schema until *S. düsseldorf* was recognized. It is of particular interest that *S. cerro* also has close O and H relationships to the Arizona paracolon bacteria. These circumstances emphasize the fact that an antigen should not be referred to as a "salmonella antigen" or a "paracolon antigen." The continuity of antigens among the Enterobacteriaceae is so pronounced that it is not always possible unequivocably to assign an organism to a certain genus. As larger numbers of cultures are studied it becomes increasingly apparent that the family is composed of a series of strains with related and interlocking antigens and that in many instances their classification in a given genus is a purely arbitrary matter which should be settled by international agreement.

Summary

Two new *Salmonella* types, *S. weslaco* (XLII:z_{36}) and *S. macallen* (III,X:z_{36}) were isolated from cats and dogs. Each type was represented by three cultures. The organisms were serologically related to the Arizona group of paracolon bacteria. The continuity of antigens in the Enterobacteriaceae and the difficulty of assigning certain cultures to a given genus were mentioned.

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Salmonella donna and *Salmonella pharr*

By James Watt,* Thelma DeCapito,* G. J. Hermann,** and P. R. Edwards**

Salmonella donna. This type was represented by two cultures isolated from rectal swabs, one from a normal baby and one from an apparently healthy cat. The biochemical properties of the cultures were those generally attributed to *Salmonella* except that gelatin was slowly liquefied. Acid and gas were produced in 24 hours from glucose, arabinose, xylose, rhamnose, maltose, trehalose, culcitol, sorbitol, mannitol, and inositol. Cellobiose was acidified after 6 days. Lactose, sucrose, raffinose and salicin were not fermented. Hydrogen sulfide was formed but indol was not produced. Vigorous growth occurred on Simmons' citrate agar, and acid was produced in Jordan's tartrate agar. When tested by the method of Kauffmann and Burón (*1*), the organisms completely utilized d-tartrate, citrate and mucate but l- and i-tartrate were not fermented.

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On serological examination the organisms were agglutinated to the titer of *S. urbana* O serum (XXX). In absorption tests the organisms were unable to exhaust the serum of agglutinins, a residue of 25 percent of the titer remained after absorption. The O antigens of *S. donna* may be represented by the symbol XXX. The H antigens were diphasic and phase 1 was agglutinated in high dilution by serums containing agglutinins for antigens 1,v;1,w;1,z_{13} and 1,z_{28}. When tested with single-factor serums the organisms were agglutinated by v serum but not by w,z_{13} or z_{28} serums. In absorption tests, all H agglutinins were absorbed from 1,v serum derived from *S. bredeney*.

Phase 2 of *S. donna* was agglutinated by serums for all the nonspecific phases. When tested with absorbed single factor serums, it reacted with serum for factor 5 but not with serums for 2, 3, 6, or 7. In absorption tests, it reduced the titer of serum derived from *S. cholerae-suis* var. *kunzendorf* from 1 to 10,000 to 1 to 500. *S. donna* is represented by the antigenic formula XXX:1,v–1,5.

Salmonella pharr. This type was represented by one culture isolated from a rectal swab taken from a normal cat. The biochemical properties of *S. pharr* differed from those of *S. donna* only in that *S. pharr* failed to ferment maltose and utilized l-tartrate. This type also slowly liquefied gelatin.

S. pharr was agglutinated by O serum derived from *S. aberdeen*, and in absorption tests removed all agglutinins from the serum. The O antigens of the organism are XI. The H antigens were diphasic and phase 1 was agglutinated in high dilution by serum derived from phase 1 of *S. paratyphi B* (b). In absorption tests the titer of *S. paratyphi B* serum was reduced from 1 to 10,000 to 1 to 1000 by absorption with phase 1 of *S. pharr*. For diagnostic purposes phase 1 may be denoted by the symbol b.

Phase 2 was agglutinated by e,n,x and e,n,z_{15} serums. When tested with single-factor serums for x,z_{15}, z_{16} and z_{17} it reacted with z_{15} and z_{17} serums. In absorption tests, phase 2 of *S. pharr* left a pronounced residue of agglutinins in e,n,z_{15} serum for both e,n,x and e,n,z_{15} forms. It can be concluded only that the phase lacks a portion of the antigenic complex denoted by the symbol n. For diagnostic purposes, phase 2 of the culture may be represented by the symbols e,n,z_{15}. The antigenic formula of *S. pharr* is XI:b–e,n,z_{15}.

New Types Found in Hidalgo County

During the 2 years in which studies on the effect of fly control on diarrheal diseases were conducted in Hidalgo County, Texas, 11 new *Salmonella* types were recognized. A total of 43 different types were found in men and animals; thus, a quarter of the types identified were first isolations. Of the new types, 7 were isolated from animals, 2 from man, and 2 from both man and animals.

The table lists these new types and presents some interesting points of similarity. Ten of the 11 types possessed a characteristic uncommon in the *Salmonella* group—the liquefaction of gelatin. Six of the types possessed similar but not identical phase-2 antigenic structures, and 3 others, similar but not identical phase-2 antigenic complexes. *S. macallen* and *S. weslaco* appear closely related in that they share similar H antigens which are also found in the Arizona group of paracolon bacilli. The explanation of these similarities is not certain. The fact that so many new types were found in a relatively small geographical area and that these types appear to be closely inter-related is compatible with the theory that the presently recognized *Salmonella* types are descended from more complex ancestors.

New Salmonella *types isolated in Hidalgo County, Tex.*

Type	Antigenic formula			Gelatin liquefaction
	"O"	Phase 1	Phase 2	
S. texas	IV, V, XII	k	enz_{15}	+
S. hidalgo	VI, VIII	r	enz_{15}	−
S. pharr	XI	b	enz_{15}	+
S. riogrande	XL	b	1, 5	+
S. edinburg	VI, VII	b	1, 5	+
S. san-juan	VI, VII	a	1, 5	+
S. mission	VI, VII	d	1, 5	+
S. lomita	VI. VII	eh	1, 5	+
S. donna	XXX	lv	1, 5	+
S. macallen	III, X	z_{36}	----	+
S. weslaco	XLII	z_{36}	----	+

Summary

Two new *Salmonella* types, *S. donna* (XXX:1,v–1,5) and *S. pharr* (XI:b–e,n,z_{15}) are described. *S. donna*, represented by two cultures, was isolated from a child and a cat. *S. pharr*, represented by one culture, was isolated from a normal cat. The 11 new types of *Salmonella* isolated in a single county in Texas are summarized and the antigenic similarities noted.

REFERENCE

(*1*) Kauffmann, F. and Alonso Burón, F.: Kulturelle Untersuchungen in der Salmonella-Gruppe mit besonderer Berücksichtigung der organischen Saüren. Ztschr. f. Hyg. u. Infektionskr **117**: 650–661 (1935).

Factors Affecting Hospital Construction In High Priority Areas

By Louis S. Reed, Ph. D., Helen Hollingsworth, A. B.,
and Anna Mae Baney, A. B.*

The primary purpose of the hospital survey and construction program is to construct hospitals and public health centers in areas of the greatest need, giving special consideration to both rural communities and those with relatively small financial resources. Although the program thus far has been quite successful in building needed facilities in many such areas, this objective has not been attained in full. Studies of the distribution of approved general hospital projects according to area priority indicate that, although 58 percent of all general hospital projects financed from 1948 allotments and 43 percent of all such projects financed from 1949 allotments are in "A" priority areas, more than 20 percent of the projects in 1948 and 30 percent in 1949 are in areas of "C" or lower priority rating. An analysis of the general hospital service areas with and without projects indicates that a somewhat greater proportion of the high rather than the very low per capita income areas are submitting projects. Similarly a larger proportion of base than of rural areas have projects.

In order to determine the major reasons why high priority areas without projects have not submitted applications for hospital construction, this special study has been made in cooperation with the State agencies.

During the latter part of February and March, data were obtained from all but three States—Delaware, New York, and Pennsylvania.[1] In the majority of States, an area frequently included more than one community. The reason given for failure to submit project applications in many areas differed for the individual communities within an area. Therefore, the following analysis has been based on the reasons reported for the separate communities rather than for a complete area. In the entire study, these reasons were provided for 436 communities in 396 "A" priority areas and 261 communities in 192 "B" priority areas.

Of the 436 communities in "A" areas, 129 have either just recently completed a project or have one scheduled or under way with or without Federal aid. Included among these 129 communities are those in which a fund drive is in process and those in which a project has been scheduled for a later year. For the remaining 307 "A" priority communities having no hospital project planned or scheduled, a total of 414 reasons was given for the lack of a project; more than one reason was given for some communities.

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*Division of Medical and Hospital Resources, Bureau of Medical Services, Public Health Service.

[1] Nevada is also excluded since, as of that date, Nevada had not submitted a plan for hospital construction.

The area's lack of financial ability to construct and/or maintain a hospital was the leading reason given in 132 cases, 32 percent of the total. It is significant that the per capita income of virtually all of these communities or hospital service areas is less than the State average; 5 percent have per capita incomes of less than one-third of the State average, 41 percent have per capita incomes of between one-third and two-thirds of the State average, and 38 percent have per capita incomes of between two-thirds and 100 percent of the State average. Only 7 percent of the communities have per capita incomes equal to or higher than the State average. Per capita income data were not available for the remaining areas—those in the Territories—which constituted 9 percent of the total. The per capita income represents the net effective income—disposable income or income after tax payments—for the year 1946 taken or derived from Sales Management.

The reason ranking second highest among those given for the lack of a project was lack of community interest and/or leadership. This reason was given in 101 instances—24 percent of the total. It is felt that there is a definite relationship between this lack of interest or leadership and the lack of ability to finance the construction and/or maintenance of a hospital. Many communities feel that they definitely cannot raise sufficient funds to finance a project so there is no community interest at all. Theirs is the feeling of "Why attempt the impossible?" This feeling, reflected in some of the reports, is borne out by the fact that the majority of these areas or communities are relatively poor—46 percent of them have per capita incomes of less than two-thirds of the State average and 49 percent, between two-thirds and 100 percent of the State average.

The availability of hospital service in the same or a nearby community led 59 communities, 14 percent of the total, to feel that there was no need for a facility. In some instances the available facility was one which the State agency had declared nonacceptable on the basis of fire or health hazards, obsolete construction, etc., but which the people of the community still considered a usable and suitable facility. In a few cases, the reply indicated that the area was improperly delineated and should not have been set up as a separate area. Lack of medical and/or hospital personnel constituted 4 percent of the total reasons given as to why applications for hospital construction had not been submitted.

Other reasons given for the lack of a project in these "A" priority communities vary widely. Among those cited are: opposition of

Table 1. *Reasons why high priority communities have not submitted applications for hospital construction, as of March 1949*

Item	"A" priority communities		"B" priority communities	
	Number	Percent	Number	Percent
Number of communities reporting, U. S. and Territories	436	100.0	261	100.0
Communities with projects completed, in process, or planned	129	29.6	89	34.1
With Federal aid [1]	*84*	*65.1*	*56*	*62.9*
Without Federal aid	*42*	*32.6*	*27*	*30.3*
Federal participation unknown	*3*	*2.3*	*6*	*6.8*
Total communities without projects scheduled or planned	307	70.4	172	65.9
Number of reasons given for lack of projects	414	100.0	212	100.0
Lack of financial ability to construct and/or maintain a facility	132	31.9	45	21.2
Distribution of communities by index of State per capita income:				
Less than 33⅓%	*7*	*5.3*	*1*	*2.2*
33⅓–66⅔%	*54*	*40.9*	*14*	*31.1*
66⅔–100%	*50*	*37.9*	*20*	*44.5*
More than 100%	*9*	*6.8*	*8*	*17.8*
Territories [2]	*12*	*9.1*	*2*	*4.4*
Lack of community interest and/or leadership	101	24.4	64	30.2
Distribution of communities by index of State per capita income:				
Less than 33⅓%	*4*	*4.0*	*1*	*1.6*
33⅓–66⅔%	*43*	*42.5*	*27*	*42.2*
66⅔–100%	*49*	*48.5*	*28*	*43.7*
More than 100%	*3*	*3.0*	*8*	*12.5*
Territories [2]	*2*	*2.0*	-----------	-----------
Availability of service in same or nearby community	59	14.3	44	20.8
Lack of medical and/or hospital personnel	15	3.6	1	.5
Other [3]	85	20.5	38	17.9
Unknown [4]	22	5.3	20	9.4

[1] Includes projects for which fund drive is in process and those scheduled for a later year because of present financial or other difficulties.

[2] Per capita income data not available.

[3] Includes such reasons as opposition of professional groups, improper area delineation, legal problems, lack of sponsor, political conflict, etc.

[4] Includes such reports as "no plan to build", "no activity to date," etc.

medical professional groups; lack of sponsor; differences of opinion among the people of the area as to which of two or more communities in the hospital service area should have the hospital; political conflicts; legal difficulties such as a ceiling imposed by State law on county bond issues and conflicts as to method of financing a facility.

In 5 percent of the total, the reason for the lack of a project was unknown. Included among these are such reports as "no plan to build," "no activity to date," etc.

Substantially the same pattern applies to "B" priority communities without hospital projects. Of the 261 such communities 89, or 34 percent, have either just recently completed a project or have one scheduled or under way, with or without Federal assistance. For the remaining 172 areas or communities, 212 reasons were given to explain the lack of a project. The most frequent reason given was a lack of community interest and/or leadership, 30.2 percent. Of the communities for which this explanation was advanced, 44 percent had

Table 2. *Reasons[1] why "A" priority communities have not submitted applications for hospital construction, as of March 1949*

State	Total communities reporting	Federally-aided projects scheduled or planned [2]	Hospital construction completed, in process, or planned without Federal aid	Construction planned, use of Federal funds unknown from data reported	Lack of financial ability to construct and/or maintain a facility — Per capita income —Percent of State average					Lack of community interest and/or leadership (includes communities needing community education) — Per capita income —Percent of State average					Availability of hospital service in same or nearby community	Lack of medical and/or hospital personnel	Other [3]	Unknown [4]
					All	Less than 33⅓%	33⅓-66⅔%	66⅔-100%	Over 100%	All	Less than 33⅓%	33⅓-66⅔%	66⅔-100%	Over 100%				
Totals, United States and Territories	436	84	42	3	[5] 132	7	54	50	9	[5] 101	4	43	49	3	59	15	85	22
Alabama	24	[6] 8	1		5		4	1		8		5	1	2	5		2	
Arizona	2	1								1			1					
Arkansas [7]	6		1		[7] 1				1						1		2	1
California	9	4			1			1		3		1	2		1			
Colorado	7	2	2		1			1									2	
Connecticut	3	2	1															
Delaware	(8)																	
District of Columbia	(9)																	
Florida	5	1			4		1	3										
Georgia	10	[6] 5	3		1		1			1		1			1			1
Idaho	3		1		2			1	1								2	
Illinois	5									1		1					4	
Indiana	13	6	1		2		1		1	1		1			3		1	
Iowa	9	5			4		2	2										
Kansas	(10)																	
Kentucky	34	3	1		7	3	3	1		11	2	7	2		2	1	16	1
Louisiana	11	1	3		6		5	1		2			2		1			
Maine	6	1			3			3		3			3		2		1	
Maryland	4	2			2				2									
Massachusetts	5	2			1			1		2			2		2			
Michigan	19	2	1	2	4			4		6			6		1		9	
Minnesota	12	1	1		1		1			6		6			4		3	
Mississippi	15	3			6		4	1	1	2		1	1		5		1	
Missouri	11	1	2		3		3			1		1			4			
Montana	(11)																	
Nebraska	10		1		1			1		5			5		3		2	
Nevada	(12)																	
New Hampshire	4	1	[13] 1		2		2			2		2			1			
New Jersey	3	2			1				1									
New Mexico	10		[14] 5		2		2			1			1				1	

New York	(8)																	
North Carolina	22	3			6	3	2	1							1			[15] 12
North Dakota	11	3			2		1	1								1	2	3
Ohio	9	5			2		1	1		1		1					2	
Oklahoma	13	2			8	1	3	3	1	2		2						[16] 1
Oregon	1				1			1										
Pennsylvania	(5)																	
Rhode Island	(17)																	
South Carolina	11		1	1	6			6							2		3	
South Dakota	4	1			2		2			1			1					
Tennessee	14	[6] 1			4		4			5	2	2	1		1		2	2
Texas	39	4	10		8		3	5		20		8	11	1	8	13	20	
Utah	2				1		1			1			1					
Vermont	6	2			4			4		4			4					
Virginia	10	2			1			1		3			3		2		4	1
Washington	2	1															1	
West Virginia	16	3			8		6	1	1	4		4			7		1	
Wisconsin	16	3	1		7		2	5		2			2		2		2	
Wyoming	(18)																	
Alaska	[19] 12				[19] 12													
Hawaii	3	1								2							2	
Puerto Rico	[20] 5		[20] 5															
Virgin Islands	(21)				(21)													

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[1] Many communities reported more than one reason for not submitting applications.

[2] Includes projects for which fund drive is in process and those scheduled for a later year because of present financial or other difficulties; excludes projects reported as included on 1948 or 1949 construction schedule.

[3] Includes such reasons as opposition of professional groups, improper area delineation, legal problems, lack of sponsor, political conflict, etc.

[4] Includes such reports as "no plan to build," "no activity to date," etc.

[5] Includes Territories for which per capita income data are not available.

[6] Applications in process or forthcoming are pending State aid.

[7] Report notes that "high cost of construction has 'scared out' a number of project applicants, especially among the Catholic facilities."

[8] No data submitted.

[9] Two projects for pediatrics and crippled children's building at Gallinger Hospital and the Children's Hospital will consume allotments for 1947–1951.

[10] All "A" priority communities are on 1948 or 1949 construction schedule.

[11] Insufficient Federal funds available to take care of "A" priority projects.

[12] Has not yet submitted a plan for hospital construction.

[13] Constructed without Federal aid due to limited available Federal funds.

[14] Health centers being planned or constructed through the Barnes Foundation.

[15] Includes communities in which there has been no activity to date and communities in which there has been some action such as study of need, formation of hospital committee, bond election scheduled, etc., but the reason for no further action is unknown.

[16] Some interest manifested, participation questionable.

[17] "Has not bypassed any areas of high priority in scheduling projects for 1948 and 1949."

[18] No difficulty in developing "A" priority projects though insufficient sponsor funds may delay some of the projects for a short time.

[19] All "A" areas are unable to raise two-thirds of the cost of construction; "a number of areas have expressed an interest to construct general hospitals and have submitted applications but in no instance has the area been able to raise more than a small fraction of the necessary funds."

[20] In 5 communities, nonprofit organizations are not interested in construction with Federal aid; one of these communities has construction under way and in 4 communities construction is planned pending approval of required funds by the Insular Legislature.

[21] "Little if any hospital construction will be undertaken due to the inability of the territory or organizations to provide two-thirds of the necessary funds."

Table 3. *Reasons [1] why "B" priority communities have not submitted applications for hospital construction, as of March 1949*

State	Total communities reporting	Federally-aided projects scheduled or planned [2]	Hospital construction completed, in process, or planned without Federal aid	Construction planned, use of Federal funds unknown from data reported	Lack of financial ability to construct and/or maintain a facility					Lack of community interest and/or leadership (includes communities needing community education)					Availability of hospital service in same or nearby community	Lack of medical and/or hospital personnel	Other [3]	Unknown [4]
					Per capita income—Percent of State average					Per capita income—Percent of State average								
					All	Less than 33⅓%	33⅓–66⅔%	66⅔–100%	Over 100%	All	Less than 33⅓%	33⅓–66⅔%	66⅔–100%	Over 100%				
Totals, United States and Territories	261	56	27	6	[5] 45	1	14	20	8	64	1	27	28	8	44	1	38	20
Alabama	13	[6] 5			3		1	1	1	2		1	1		2			3
Arizona	5	1			1				1	4				4			1	
Arkansas [7]	12	1	2	1	(7)					4			4		2		3	
California	7									1		1			5		6	
Colorado	6		2		3			1	2	1				1	1			
Connecticut	(8)																	
Delaware	(9)																	
District of Columbia	(10)																	
Florida	11	2			3		1	2									[11] 3	3
Georgia	21	[6] 8	[12] 2							4			4					[13] 7
Idaho	2				2			2										
Illinois	(8)																	
Indiana	(8)																	
Iowa	(8)																	
Kansas	1	1																
Kentucky	16	3	1		1	1				9	1	2	6		6		3	[14] 1
Louisiana	13		1		7		4	2	1	4		3	1				2	
Maine	9	2	1		2			1	1	6			4	2	6			
Maryland	(15)																	
Massachusetts	(8)																	
Michigan	10	3	1	2	2			2		1			1		1		2	
Minnesota	(8)																	
Mississippi	2			2														
Missouri	12	4	3		1		1			1		1			2		2	
Montana	(16)																	
Nebraska	13	1	2							2		1	1		3			
Nevada	(17)																	
New Hampshire	4	1	[18] 1														2	
New Jersey	6	5			2			2							2		2	2
New Mexico	3		1		1		1			1		1						
New York	(9)																	
North Carolina	3	3																
North Dakota	5	1	1							2		2			1	1		
Ohio	3	2								1			1				1	
Oklahoma	9		1		2			2		4		3	1					[19] 2

Oregon	7	3	1	----	1	----	----	1	----	2	----	----	2	----	----	----	----	----
Pennsylvania	(6)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Rhode Island	(20)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
South Carolina	5	3	1	----	----	----	----	----	----	----	----	----	----	----	1	----	----	----
South Dakota	1	----	----	----	1	----	----	1	----	----	----	----	----	----	----	----	----	----
Tennessee	26	[6] 2	----	----	5	----	4	1	----	11	----	10	1	----	1	----	[21] 7	[22] 2
Texas	5	3	2	----	----	----	----	----	----	----	----	----	----	----	----	----	1	----
Utah	1	----	----	----	1	----	1	----	----	----	----	----	----	----	----	----	----	----
Vermont	1	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Virginia	9	1	----	----	2	----	----	1	1	2	----	1	----	1	5	----	3	----
Washington	(23)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
West Virginia	10	----	----	1	[24] 2	----	----	1	1	2	----	1	1	----	6	----	----	----
Wisconsin	1	----	----	----	1	----	1	----	----	----	----	----	----	----	----	----	----	----
Wyoming	(25)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Alaska	(26)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Hawaii	2	----	----	----	2	----	----	----	----	----	----	----	----	----	----	----	----	----
Puerto Rico	4	----	[27] 4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Virgin Islands	(28)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

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[1] Many communities reported more than one reason for not submitting applications.

[2] Includes projects for which fund drive is in process and those scheduled for a later year because of present financial or other difficulties; excludes projects reported as included on 1948 or 1949 construction schedule.

[3] Includes such reasons as opposition of professional groups, improper area delineation, legal problems, lack of sponsor, political conflict, etc.

[4] Includes such reports as "no plan to build", "no activity to date", etc.

[5] Includes Territories for which per capita income data are not available.

[6] Some applications are pending State aid.

[7] Report notes that "high cost of construction has 'scared out' a number of project applicants, especially among the Catholic facilities."

[8] No data reported for "B" priority communities.

[9] No data submitted.

[10] Two projects for pediatrics and crippled children's building at Gallinger Hospital and the Children's Hospital will consume allotments for 1947–51.

[11] No additional construction is being planned in areas having more than 65 percent of needs met.

[12] An application is expected for equipment for one of these projects.

[13] In 6 communities some interest has been shown but reason for no action is unknown.

[14] Some interest in replacing existing facility; no application, reason unknown.

[15] "B" priority communities, except I–4 (which is on 1948 construction schedule) have not submitted applications because Maryland's allotment of Federal funds is so limited that all 1948 and 1949 funds were allotted to areas of higher priority.

[16] No consideration can be given to requests from "B" priority communities since there are not sufficient Federal funds available to take care of the "A" priority group projects.

[17] Has not yet submitted a plan for hospital construction.

[18] An addition built without Federal aid; hopes to receive retroactive Federal assistance.

[19] Some interest manifested, but participation questionable.

[20] "Has not by-passed any areas of high priority in scheduling projects for 1948 and 1949."

[21] Five communities have not submitted applications because construction has been scheduled for 2 area centers.

[22] In one community there has been some expression of interest but no definite development.

[23] Only one "B" priority area which has submitted an application.

[24] In one community, expansion would go ahead if a high percentage of Federal participation is approved.

[25] "There is no lack of interest but there may be a lack of funds both from the sponsors' standpoint and also from the Federal standpoint which on the present allotment basis will allow us to build about one hospital a year."

[26] No data reported for the "B" priority area.

[27] None of the eligible nonprofit organizations have shown interest in hospital construction with Federal aid; 2 facilities are currently under construction and 2 communities have projects planned pending approval of required funds by the Insular Legislature.

[28] No "B" priority areas.

per capita incomes of less than two-thirds of the State average and 44 percent had per capita incomes of two-thirds to 100 percent of the State average.

The next most frequent reason advanced was lack of financial ability to construct and/or maintain a hospital; this reason was given in 21.2 percent of the cases. As with "A" priority areas, the per capita income of these areas was relatively low in comparison to the State average.

Availability of service in the same or nearby community was cited as an explanation for lack of a project in 20.8 percent of the areas; lack of medical and/or hospital personnel in 0.5 percent of the cases, and miscellaneous other reasons in 17.9 percent. For 9 percent of the areas no reason was advanced.

The tables show by State the number of "A" and "B" priority communities for which data were obtained and summarize the reasons given for the lack of hospital projects in these communities.

Summary

The two most important reasons why communities in high priority areas thus far without hospital construction projects have not submitted projects are lack of financial ability to construct and/or maintain a hospital and lack of community interest or leadership.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JANUARY 28, 1950

In the United States increases for the current week are noted in reported cases of diphtheria (from 149 to 199), influenza (from 4,563 to 6,512), measles (from 4,329 to 4,580), scarlet fever (from 1,649 to 1,860), typhoid and paratyphoid fever (from 43 to 50), and whooping cough (from 2,192 to 2,888).

The reported incidence of influenza increased in the South Atlantic, the East South Central, and the West South Central Divisions. The largest increases were in Georgia (314 to 1,400) and Virginia (558 to 1,173) in the South Atlantic Division. Other States reporting increases in influenza were: Kentucky (0 to 18), Tennessee (26 to 117), Alabama (98 to 287), and California (8 to 39). Hawaii reported 133 cases for the week. For the Nation, the 5-year (1945–49) median is 4,534 for the corresponding week. The cumulative total for reported incidence of influenza for the calendar year is 19,477, as compared with 17,341 for the corresponding 5-year (1945–49) median. However, on the basis of seasonal years, the current cumulative total of 50,007 cases is lower than the corresponding median of 53,611 for the 5 (1944–45 to 1948–49) years.

Reported incidence of whooping cough increased in all geographic divisions except the Pacific. These increases were mainly along the Atlantic Coast with the largest increase in Georgia (4 to 216). Other increases are noted in Vermont (27 to 92) and New York (241 to 300).

States reporting the largest increase in measles were Michigan (910 to 1,060) and California (118 to 266).

New Mexico reported 1 case of confirmed bubonic plague (glandular) in Maljamar, Lea County. One case of smallpox and an increase from 7 to 48 cases of scarlet fever were reported in Arizona. One case of anthrax was reported in New York.

For the Nation, meningococcal meningitis decreased from 106 to 79, pneumonia from 2,274 to 2,104, poliomyelitis from 117 to 114, and tularemia from 32 to 25.

Of 42 States and the District of Columbia reporting on rabies in animals, for 24 and the District of Columbia, there were no cases. The remaining 18 States reported 142 cases with the largest numbers in Texas (32), Kentucky (26), New York (17), and Georgia (14).

Telegraphic case reports from State health officers for week ended January 28, 1950

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	1	----	----	28	1	2	----	----	8	----	----	----	35	----
New Hampshire	2	----	----	3	----	8	----	----	3	----	----	----	1	----
Vermont	----	----	----	----	----	----	----	----	7	----	----	----	92	----
Massachusetts	7	----	----	62	----	----	----	----	123	----	----	----	147	----
Rhode Island	----	----	----	----	----	2	----	----	6	----	----	----	11	----
Connecticut	----	----	----	18	1	59	----	----	16	----	----	----	121	----
MIDDLE ATLANTIC														
New York	9	2	[1] 3	321	3	231	4	----	[2] 146	----	----	----	300	17
New Jersey	----	1	----	416	1	73	1	----	47	----	----	12	189	1
Pennsylvania	10	----	----	108	2	65	2	----	114	----	----	----	245	----
EAST NORTH CENTRAL														
Ohio	14	----	5	136	7	71	5	----	288	----	----	4	175	5
Indiana	8	1	4	66	2	11	1	----	53	----	----	2	31	----
Illinois	2	1	1	94	6	69	2	----	78	----	2	----	67	3
Michigan	----	----	----	1,060	5	24	4	----	166	----	----	1	260	4
Wisconsin	2	----	11	157	3	15	2	----	68	----	----	----	162	----
WEST NORTH CENTRAL														
Minnesota	1	----	----	36	2	----	5	----	33	----	----	----	17	----
Iowa	1	----	----	185	1	1	5	----	10	----	----	2	9	6
Missouri	1	----	6	11	2	24	----	----	19	----	5	5	37	----
North Dakota	1	----	1	2	4	----	----	----	----	----	----	----	----	----
South Dakota	----	----	----	5	----	1	1	----	4	----	----	----	2	----
Nebraska	----	----	----	97	----	1	1	----	9	----	----	----	9	----
Kansas	1	----	----	43	----	20	----	----	39	----	----	----	9	3
SOUTH ATLANTIC														
Delaware	----	----	1	30	----	----	----	----	6	----	----	1	2	----
Maryland	13	----	2	22	1	36	1	----	28	----	2	1	72	----
District of Columbia	----	----	----	48	----	31	----	----	10	----	----	----	1	----
Virginia	5	----	1,173	40	1	132	----	----	35	----	1	----	33	1
West Virginia	4	----	26	213	2	7	----	----	33	----	----	----	42	4
North Carolina	12	----	----	158	----	----	1	----	48	----	2	----	35	----
South Carolina	7	1	26	138	3	16	----	----	2	----	----	1	10	6
Georgia	1	----	1,400	24	1	23	1	----	20	----	1	----	216	14
Florida	5	----	4	41	3	10	3	----	8	----	2	1	15	----

EAST SOUTH CENTRAL														
Kentucky	8	---	18	9	1	9	---	---	28	---	2	1	18	26
Tennessee	8	---	117	84	4	---	2	---	32	---	2	5	48	6
Alabama	19	---	287	52	---	92	2	---	16	---	1	---	6	5
Mississippi	5	---	11	54	2	32	2	---	7	---	---	---	---	3
WEST SOUTH CENTRAL														
Arkansas	5	---	176	19	4	77	3	---	4	---	2	5	80	---
Louisiana	2	---	2	4	---	38	---	---	1	---	1	4	2	---
Oklahoma	5	1	135	5	1	79	---	---	8	---	---	1	24	3
Texas	26	1	2,831	93	10	646	34	---	52	---	---	3	135	32
MOUNTAIN														
Montana	---	---	15	38	---	---	---	---	33	---	1	1	---	---
Idaho	1	---	22	2	---	13	3	---	7	---	---	---	3	---
Wyoming	---	---	---	3	---	4	2	---	7	---	---	---	10	---
Colorado	---	---	51	135	1	29	3	---	8	---	---	---	20	3
New Mexico	3	---	3	12	---	45	---	---	10	---	1	---	14	---
Arizona	---	1	124	74	---	18	---	---	48	1	---	---	26	---
Utah	1	---	6	140	---	3	---	---	4	---	---	---	16	---
Nevada	---	---	---	1	---	---	5	---	---	---	---	---	---	---
PACIFIC														
Washington	---	---	6	---	---	10	---	---	41	---	---	---	22	---
Oregon	1	---	6	27	---	24	1	---	17	---	---	---	14	---
California	8	1	39	266	5	53	18	---	110	---	---	---	105	---
Total	199	10	6,512	4,580	79	2,104	114	---	1,860	1	25	50	2,888	142
Median, 1945–49	289	6	4,534	6,712	86	---	48	---	2,964	4	26	40	2,117	---
Year to date 4 weeks	719	45	19,477	16,899	352	8,850	478	4	6,166	6	108	155	8,899	[3] 526
Median, 1945–49	1,277	26	17,341	20,285	350	---	210	1	10,174	17	133	166	8,985	---
Seasonal low week ends	(27th) July 9	---	(30th) July 30	(35th) Sept. 3	(37th) Sept. 17	---	(11th) Mar. 19	---	(32d) Aug. 13	(35th) Sept. 3	---	(11th) Mar. 19	(39th) Oct. 1	---
Since seasonal low week	4,990	---	50,007	36,029	1,265	---	[3] 41,960	---	22,605	13	---	3,312	30,435	---
Median, 1944–45 to 1948–49	8,843	---	53,611	46,409	1,316	---	19,156	---	36,374	71	---	3,694	33,354	---

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[1] New York City only.
[2] Including cases reported as streptococcal sore throat.
[3] Delayed reports. New Jersey, 1 case of rabies in animals, week ended January 21; Michigan, 3 cases of poliomyelitis for 1949, not assignable to specific weeks.
Anthrax: New York, 1 case.
Bubonic plague: One case in Maljamar, Lea county, New Mexico.
Alaska: Measles 30.
Hawaii: Influenza 133, scarlet fever 4.

BUBONIC PLAGUE IN LEA COUNTY, NEW MEXICO

One case of bubonic plague (glandular) was reported and confirmed in Maljamar, Lea County, New Mexico, on January 27, 1950.

DEATHS DURING WEEK ENDED JANUARY 28, 1950

	Week ended Jan. 28, 1950	Corresponding week, 1949
Data for 94 large cities of the United States:		
Total deaths	9, 854	9, 518
Median for 3 prior years	9, 654	
Total deaths, first 4 weeks of year	39, 042	40, 114
Deaths under 1 year of age	670	635
Median for 3 prior years	680	
Deaths under 1 year of age, first 4 weeks of year	2, 527	2, 745
Data from industrial insurance companies:		
Policies in force	69, 851, 041	70, 648, 953
Number of death claims	14, 460	13, 664
Death claims per 1,000 policies in force, annual rate	10 8	10. 1
Death claims per 1,000 policies, first 4 weeks of year, annual rate	10. 0	9. 6

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended January 7, 1950.—During the week ended January 7, 1950, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	New-foundland	Prince Edward Island	Nova Scotia	New Bruns-wick	Que-bec	On-tario	Mani-toba	Sas-katch-ewan	Alber-ta	Brit-ish Co-lum-bia	Total
Chickenpox			63	3	99	517	58	101	91	82	1, 014
Diphtheria	1				5	4			2		12
Dysentery, bacillary							2			6	8
Encephalitis, infectious							1				1
German measles			5		2	107		16	219	49	398
Influenza			55			5	9			3	72
Measles			20		132	355	50	96	165	219	1, 037
Mumps			99		14	493	4	3	98	144	855
Poliomyelitis				1		1					2
Scarlet fever	1		3	2	24	31	11	7	72	10	161
Tuberculosis (all forms)	7			7	89	23	18	10		45	199
Typhoid and paratyphoid fever					2		1				3
Undulant fever					1						1
Venereal diseases:											
Gonorrhea	7	2	5	4	135	68	32	16	22	90	381
Syphilis	3	1	1	4	37	16	6	4	2	9	83
Other forms					2						2
Whooping cough	1		28		19	44	3	10	2	4	111

CHINA

Cerebrospinal Meningitis and Smallpox.—Under date of January 21, 1950, a serious epidemic of cerebrospinal meningitis, smallpox, and other diseases were reported in Hsiang-Yang District of north Hupeh. The first fatalities were reported late in December and by early January were spreading south and east from the Lao-Ho-Kou Region. More than 300 deaths occurred in a few days in the region of Hung-Shan.

CUBA

Habana—Notifiable diseases—5 weeks ended December 31, 1949.—Certain notifiable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox	2		Measles	1	
Diphtheria	9		Tuberculosis	4	3
Malaria	2		Typhoid fever	8	

Provinces—Notifiable diseases—5 weeks ended December 31, 1949.—Notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	8	16	12	29	4	26	95
Chickenpox		1	2	2			5
Diphtheria	1	9	5	1	2	3	21
Leprosy		4		1		1	6
Malaria	2	2			6	50	60
Measles		1		1	19		21
Tetanus		1					1
Tuberculosis	6	10	15	8	12	22	73
Typhoid fever	4	11	2	4	4	13	38
Whooping cough		28			1		29

[1] Includes the city of Habana.

JAMAICA

Notifiable diseases—3 weeks ended November 19, 1949, and 5 weeks ended December 31, 1949.—Cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	3 weeks ended November 19, 1949 [1]		5 weeks ended December 31, 1949	
	Kingston	Other localities	Kingston	Other localities
Chickenpox	2	25	3	15
Diphtheria	5	3	2	
Dysentery, unspecified			1	
Erysipelas		2		1
Leprosy		1		
Poliomyelitis		1		1
Tuberculosis (pulmonary)	37	34	36	39
Typhoid fever		37	11	46

[1] Report for week ended November 26, 1949, not received.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India.—During the week ended January 14, 1950, cholera was reported in Calcutta (42 cases with 12 deaths), Negapatam (14 cases with 3 deaths), and Madras (2 cases with 1 death).

Plague

Siam (*Thailand*).—During the week ended January 7, 1950, one case of plague was reported in Kanburi Province, Siam.

Smallpox

Arabia.—During the week ended January 14, 1950, 19 cases of smallpox were reported in Jedda and 11 cases of smallpox were reported in Mecca.

Burma.—During the week ended January 14, 1950, smallpox was reported in Bassein (86 cases), Moulmein (4 cases), and Rangoon (45 cases).

Indonesia—Java.—During the week ended January 14, 1950, 19 cases of smallpox were reported in Djakarta, Java. During the week ended January 7, 1950, 16 cases with 1 death were reported in Djakarta.

Siam (*Thailand*).—During the week ended January 14, 1950, 125 cases with 15 deaths were reported in Srisaket Province, Siam.

Typhus Fever

Turkey.—During the week ended January 14, 1950, three cases of typhus fever were reported in Izmir, Turkey.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

VOLUME 65 FEBRUARY 24, 1950 NUMBER 8

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
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Public Health Reports

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Effects of DDT Mosquito Larviciding on Wildlife

V. Effects on Fishes of the Routine Manual and Airplane Application of DDT and Other Mosquito Larvicides

By CLARENCE M. TARZWELL, PH. D.*

Preliminary tests with DDT for the control of mosquitoes, forest insects, and agricultural pests demonstrated that it was toxic to a wide variety of animal life. Because there were indications that the new insecticide would be widely used, apprehension was expressed by some groups that its extensive or indiscriminate use would cause extensive harm to wildlife.

The desirability of carefully controlled use was early recognized by those in charge of extensive programs for the control of insects of public health importance. A joint statement of policy for the use of DDT issued early in 1945 (*1*) by the Army and the Public Health Service announced that widespread use of DDT would be delayed until studies could determine its effects on beneficial insects and higher forms of life. The Fish and Wildlife Service, the Bureau of Entomology and Plant Quarantine, and the Public Health Service have conducted extensive cooperative investigations in several parts of the country. The first two agencies have studied the effects on wildlife of single treatments with large dosages of DDT. The Public Health Service has principally studied the consequences of using small dosages of DDT routinely over considerable periods. Methods of application and frequency of treatment were the same as those commonly used in regular malaria control larviciding programs in order to ascertain at what dosage, if any, and in what manner or physical state DDT might be used in regular malaria control operations without being significantly harmful to organisms of economic or recreational importance.

Investigations were begun late in 1944 (*2*) and a phase of the study, the effect on fishes of several years of routine airplane treatment, was continued into 1948. Intensive reasearch on possible changes in the aquatic biota induced by routine ground application of DDT larvicides was begun and carried out in 1945 (*3*). In 1946, studies were begun on the consequences of airplane application, and the inquiry was broadened to include not only the aquatic forms but also reptiles, birds, mammals, and terrestrial insects in marginal areas. Moreover, DDT and several of the newer insecticides were applied routinely, at several dosages, to small deep water ponds by means of air pressure hand sprayers in order to determine their comparative after-effects on aquatic life.

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In 1947, tests were limited to the determination of the consequences of routine airplane larviciding on fishes, and further observations were made on the use of DDT and DDD in small ponds.

During 1948, two areas were routinely larvicided by airplane and, as in former seasons, fish population studies were made at the end of the season for the determination of any effects on the standing fish populations.

Effects of Manual Application

Studies of the effects of manual dispersions of DDT larvicides were conducted on 64 coastal plain ponds lying within a 20-mile radius from Savannah, Georgia. Most of these ponds had sand bottoms and several had a minimum of rooted aquatic vegetation or organic debris. Preliminary inquiries on several DDT solvents and various formulations of DDT dusts, emulsions, and solutions were made on 42 of the ponds for the determination of the most desirable methods of application, types of larvicidal preparations, and dosages of DDT to use in the routine intensive studies made on 22 ponds.

Several types of dusters and doses of 0.1 to 0.4 pound of DDT per acre were used in the preliminary dust tests. The Hudson rotary duster and a dust mixture consisting of 1 part DDT and 99 parts pyrophyllite were selected for the routine studies. This dust was applied at the rate of 10 pounds per acre, giving a dose of 0.1 pound of DDT per acre. Air pressure hand sprayers were employed for the dispersion of solutions and emulsions. Emulsions were sprayed uniformly over the surface of the ponds at the rate of 15 gallons per acre and at dosages of 0.05 to 0.2 pound of DDT per acre. These were made by adding 1 gallon of a solution consisting of DDT, emulsifier, and fuel oil or some other solvent to 14 gallons of water. Solutions were applied by air pressure hand sprayers, equipped with atomizing nozzles, at rates of 0.5 to 2 gallons per acre and dosages of from 0.025 to 2 pounds of DDT. Routine treatments were made at weekly intervals. All ponds were seined prior to treatment to determine the species of fish present and to gain some idea of their relative abundance. Observations for the detection of dead fish were made in untreated and treated ponds just before use of the larvicide and 24 and/or 48 hours thereafter. At the completion of treatment, the ponds were seined or the fish poisoned to ascertain the remaining population.

Results

Preliminary tests were made with 15 different solvents employed separately at rates of 0.5 to 2 gallons per acre or combined with DDT at the rate of 0.1 pound per acre. In trials at 1 gallon per acre, Dioxane, turpentine, methyl alcohol, and butyl alcohol did not kill fish, but they were toxic as indicated by the decimation of aquatic insects. Isopropyl alcohol, ethyl alcohol, and acetone were much less toxic as indicated by the smaller number of surface aquatic insects killed. Different samples of No. 2 fuel oil varied greatly in toxicity. In general, fuel oil was found to be more toxic than kerosene, alcohol, acetone or Arosol; about as toxic as Solvesso No. 1 and 3 and Mentor No. 28; but less toxic than Velsicol NR–70.[1] However, when used with DDT at 0.1 pound per acre, these solutions are much more toxic than any of the solvents tested when they are applied alone at a rate of 1 gallon per acre. When utilized alone at rates of 2 gallons per acre, Velsicol NR–70 and fuel oil No. 2 caused a noteworthy effect on surface insects. Velsicol NR–70 produced a distinct persistent scumlike film and was the most toxic solvent tested. If DDT solutions are to be employed at rates of 2 gallons per acre, it would seem desirable to use kerosene or some of the less toxic solvents in preference to Velsicol or fuel oil No. 2; but used at an application rate of 1 gallon of DDT solution per acre, the difference between most samples of No. 2 fuel oils and kerosene does not appear to be significant.

It early became apparent that stable DDT emulsions were more toxic to amphibians, fishes, larger crustacea, and several orders of aquatic insects than were DDT solutions and dusts. Similar conclusions were reached by Eide, Deonier, and Burrell (*7*) on the basis of their field studies, and by Ginsburg (*8*) on the basis of his preliminary laboratory tests. It was also found that single applications of DDT solutions applied at dosages of 0.4 pound or more of DDT per acre were toxic to fish. One application at 0.4 pound per acre killed only a few fish, but single applications of 1 to 2 pounds per acre killed most or all of the fish. Single applications of solutions at a dosage of 0.1, 0.05, and 0.025 pound per acre and dusts at 0.1 or 0.2 pound of DDT per acre did not kill fish. Stable emulsions and solutions applied at the rate of 0.4 pound or more per acre were therefore abandoned in favor of dusts or solutions applied at the rate of 0.1, 0.05, or 0.025 pound of DDT per acre for routine applications in the 22 ponds to be studied intensively.

A woodland pond, just above the tidal zone at the outskirts of

---

[1] The use of a trade name does not represent an endorsement of the product by the Public Health Service.

Savannah, was routinely dusted 26 times at an average rate of 0.2 pound of DDT per acre. This pond had considerable organic bottom materials and emergent vegetation over about a third of its area. During the period of testing, only one dead fish, *Gambusia affinis holbrookii*, and one dead crab were found. Seining before and after treatment indicated little or no change in the fish population. Fishes present were *Mugil cephalus*, *Cyprinus carpio*, *Anchoa mitchilli*, *Mollienisia latipinna*, *Fundulus heteroclitus heteroclitus*, *Gambusia affinis holbrookii*, *Fundulus chrysotus*, *Cyprinodon v. variegatus*, *Trinectes maculatus fasciatus*, *Gobionellus shufeldti*, and *Micropogon undulatus*.

A series of tests was conducted in three areas of one of the large ponds in the Savannah River Migratory Waterfowl Refuge. This pond had a thick layer of organic debris over its bottom and considerable floating and emergent vegetation. The most common plant forms were cutgrass (*Zizaniopsis miliacea*), waterlily (*Nymphaea odorata*), jussiaea (*Jussiaea leptocarpa*), alligator-grass (*Alternanthera philoxeroides*), pickerelweed (*Pontederia lanceolata*), and watershield (*Brasenia schreberi*). Three similar adjacent areas were chosen for study. Two areas were treated and the third was kept as an untreated check. The treated areas were contiguous and separated from each other and the large pond by means of a barrier seine, a waterproofed canvas provided with lead and float lines and held in place by stakes (*9*). These ponds were treated weekly for 18 weeks, one being dusted at the rate of 0.1 pound of DDT per acre and the other sprayed with a mist spray of 1 gallon of fuel oil and 0.05 pound of DDT per acre. Weekly observations were made for the detection of fish kill. Gross observations indicated that the fauna of the plot receiving the oil spray was more affected than that of the dust plot. Some spotting of the vegetation by the oil was noted after each treatment, but such changes disappeared before the next treatment, and the aquatic vegetation thrived throughout the period of study. After the fourth spraying, a crab, *Callinectes sapidus*, a frog, and a fish, *Fundulus dispar lineolatus*, were found dead. No dead fish were detected in the dusted or check pond.

A series of observations, using several dosages of DDT, was made on 14 small artificial ponds. Well water was piped to these ponds, and the water level was kept fairly constant by means of float valves. The ponds were filled early in the season and stocked with plankton, aquatic insects, bottom organisms, and fish which readily became established. Beds of *Chara* developed rapidly. Weekly treatments were begun August 1, 1945, a total of 18 being applied. Table 1 indicates the nature of each test and its biological consequences. Ponds 5, 6, 7, 8, 10, 11, 12, 13, and 14 were small, measuring 5 by 15 feet and having an average depth of about 6 inches. Ponds 1 and 2

Table 1. *Summary of the fish kill in 14 experimental ponds by specified dosages of DDT applied in 18 weekly treatments and the number of fish remaining at the end of the treatment as indicated by poisoning (K=killed; A=alive)*

Treatment	Untreated check ponds						Fuel oil		Dust				DDT dissolved in No. 2 fuel oil												
Dosage	None						1 gallon per acre		0.1 pound DDT per acre				0.025 pound per acre				0.05 pound per acre				0.1 pound DDT per acr				
Ponds	5		10		11		6		2		12		14		15		13		16		1		8		1
	K	A	K	A	K	A	K	A	K	A	K	A	K	A	K	A	K	A	K	A	K	A	K	A	K
Gambusia affinis holbrookii	--	8	--	335	--	922	--	1	--	----	4	373	--	4	--	18	1	75	5	1	--	--	3	--	13
Fundulus dispar lineolatus	--	--	--	1	--	---	--	--	--	----	--	---	--	--	--	--	--	--	--	--	--	--	--	--	--
F. chrysotus	--	1	--	25	--	---	--	--	--	----	--	---	--	--	--	--	--	--	5	2	--	--	2	--	12
Heterandria formosa	--	--	--	---	--	---	--	--	--	----	--	---	--	--	--	9	--	--	2	5	--	--	--	--	3
Ameiurus nebulosus marmoratus	--	--	--	---	--	1	--	--	--	----	--	---	--	--	--	9	--	--	15	--	--	--	--	--	1
A. natalis erebennus	--	--	--	---	--	---	--	--	--	----	--	---	--	--	--	--	--	--	--	3	--	--	--	--	5
Chaenobryttus coronarius	--	--	--	---	--	---	--	--	--	----	--	---	--	--	--	1	--	--	1	--	--	--	--	--	1
Enneacanthus obesus	--	--	--	---	--	---	--	--	--	----	--	---	--	--	--	--	--	--	5	--	--	--	--	--	--
Anguilla bostoniensis	--	--	--	---	--	---	--	--	--	----	--	---	--	--	--	1	--	--	--	--	--	--	--	--	--
Crayfish	--	--	--	---	--	---	--	--	--	----	--	---	--	--	--	--	--	1	--	--	13	--	1	--	--
Tadpoles	--	--	--	1	--	51	--	--	--	----	2	162	2	--	--	1	--	--	--	--	--	--	--	--	--
Totals	0	9	0	362	0	974	0	1	0	All	6	535	2	4	0	39	1	76	33	11	13	0	6	0	35

were the same size but had concrete bottoms and were about 1 foot deep. Fish plantings in the small ponds were largely confined to top minnows. Three ponds were larger; pond 15 measured 12 by 28 feet; pond 16, 14 by 28 feet; and pond 17, 30 by 30 feet. These ponds ranged in depth from 6 to 10 inches, and larger fish were placed in them. Fish stocking in the various ponds was not uniform as to number.

As indicated in table 1, no reduction in fish numbers was noted in the untreated check ponds, and large fish populations were present in two of them at the termination of the study. There was no observed harm to fish in the pond treated with 1 gallon of fuel oil per acre. Killing was insignificant in the ponds dusted at the rate of 0.1 pound of DDT per acre, and no dead fish were found in the ponds routinely sprayed at a dosage of 0.025 pound of DDT per acre. There was a pronounced decimation in one of the ponds receiving 0.05 pound of DDT per acre as a spray, but only one dead fish was found in the other one. The routine spray treatments at 0.1 pound of DDT per acre destroyed the fish and crayfish. Only a portion of the fish killed was noted by the weekly observations. Many were taken by fish-eating birds between inspections.

At the end of the season, snails were abundant in all of the treated ponds. The first two treatments at all doses killed most of the crayfish. In the dust-treated pond, the first dead fish was found after the fourteenth treatment. In the ponds sprayed at the rate of 0.05 pound of DDT per acre, the first reduction was noted in one pond after the eighteenth treatment, and in the other, after the eleventh; the next dead fish was found following the thirteenth treatment. In the ponds treated at the rate of 0.1 pound of DDT per acre, the first deaths were noted after the tenth treatment. The bullheads, *Ameiurus nebulosus marmoratus* and *Ameiurus natalis erebennus*, were the first fishes to show indications of DDT poisoning. Some of these were sick for more than 3 weeks before they died. During this time they lay gasping, turned slightly on their sides. When disturbed, they swam slowly and erratically.

The earliest results were exhibited by the bullheads and not the top minnows as expected. Bullheads may possibly be affected due to their habit of swimming near the bottom so that their barbels drag over it, thus bringing these sensory organs in direct contact with the DDT which has recently settled. Chemical tests made for the determination of the deposition of DDT in ponds 1 and 2 demonstrated a considerable amount on the bottoms. Bottom material of about one-eighth inch in thickness was collected from 2 square-foot areas in these ponds and chemically analyzed for DDT. During the course of the 18 treatments, these ponds had received a total dose of 1.8 pounds of DDT per acre. DDT was found on the bottom of the oil-treated pond in the amount of 0.29 pound per acre, and in the dusted pond 0.83 pound per acre was recovered. This latter amount is almost half the total applied. At the time of analysis, DDT had possibly been absorbed by the soil and was biologically inactive, but after extraction with benzene, it regained its insecticidal properties as ascertained in laboratory tests. It is not known how rapidly or how much DDT can be inactivated by the soil, but the amount must be considerable because there was very little soil on the concrete bottoms of these ponds.

Routine studies were also made on four ponds in the Camp Stewart area near Richmond Hill in Bryan County, Ga. Three of these ponds designated as Nos. 11, 12, and 13 lie in an area annually covered by high flood waters of the Canoochee River and are naturally stocked with fish. Observations were begun after a flood period when these three ponds had been confluent. Thus, their fish populations were originally similar. The ponds differed, however, in that pond 13 had some clay in its bottom while ponds 11 and 12 had sand bottoms, more vegetation, and were deeper. Areas of ponds 11 and 12 were about 0.08 acre, while pond 13 contained 0.14 acre at the beginning of the study. Water levels in the ponds dropped during the course of the work, and the dose was adjusted as their areas decreased. A grass-like *Eleocharis* and a narrow leaf *Potamogeton* were the dominant plants in pond 12. The narrow leaf *Potamogeton* was particularly abundant in pond 11. Pond 13 was fringed with a small grass-like *Eleocharis* and a smart-weed, *Polygonum*, was abundant in one end. The water in ponds 11 and 12 was clear, but cloudy in pond 13. Larviciding was begun September 13, and a total of 11 applications was

Table 2. *Summary of the fish kill and the fish remaining in four experimental ponds after routine weekly treatments with specified dosages of DDT (K=killed; A=alive)*

Character of application	None	DDT in kerosene		DDT in kerosene		DDT in fuel oil No. 2	
Number of treatments	None	11		11		22	
Dosage per treatment	Check	0.1 pound DDT per acre		0.05 pound DDT per acre		0.1 pound DDT per acre	
Ponds	11	12		13		5	
	*A	K	A	K	A	K	A
Lepisosteus platyrhincus							
Erimyzon sucetta sucetta	35	7				5	
Notemigonus crysoleucas bosci	81	3					1
Notropis maculatus	3						1
Ameiurus nebulosas marmoratus						2	5
A. natalis erebennus	322	10	1	13	1		
Esox americanus	3			2		1	
E. niger	2						
Anguilla bostoniensis	1		1	1	1		11
Fundulus chrysotus	202	17				10	1
F. dispar lineolatus	163	2				3	
Leptolucania ommata							11
Heterandria formosa	1, 231					1	673
Mollienisia latipinna						12	113
Gambusia affinis holbrookii	2, 119	40		1			3
Aphredoderus sayanus	5				2		1
Hololepis barratti	9						
Enneacanthus obesus	121						
E. gloriosus	108	2				2	
Centrarchus macropterus		5				1	
Acantharchus pomotis	1						1
Chaenobryttus coronarius	111	2		1		13	1
Lepomis microlophus microlophus	5	5				5	
L. macrochirus purpurescens	2	4				1	
L. auritus	2	10				4	2
L. marginatus	109	17				9	
L. punctatus punctatus	25	2					
Miscellaneous sunfishes	79	26		3	1	33	6
Huro salmoides	4	3					
Elassoma evergladei	818	2	13		15		1
Labidesthes sicculus vanhyningi	9						
Palaemonetes	19						
Cambarus	93	8	2	2	12		2
Frogs		3					
Tadpoles	877			1	1	3	7
Amphiuma means	1						
Siren sp.	3		2		24		
Natrix sipidon fasciata				2			
Totals	6, 563	168	19	26	57	105	840
Fish only	5, 570	157	15	21	20	102	831

*None killed.

made. Pond 11 was retained as an untreated check; pond 12 received 0.1 pound of DDT per acre, and pond 13, 0.05 pound per acre dispersed as a mist spray at the rate of 1 and 0.5 gallon per acre, respectively.

No dead fish were found in the check pond. In pond 12 (table 2) the first dead fish, a largemouthed bass and a golden shiner, were found after the second treatment. The third treatment was strikingly lethal with 32 fish being recovered, among which were largemouthed bass, bluegills, warmouth bass, flyer sunfish, golden shiners, top minnows, and a small frog. Fish were found dead following each subsequent treatment. In pond 13, the first reduction of fish numbers was noted after the third treatment, but there was a moderate fish population present after the fourth treatment. At that time, one haul of a 20-foot seine across the pond netted the following: long-nosed gar, 1; golden shiners, 15; bullheads, 6; bluegills, 9; other sunfishes, 22; tadpoles, 9; crayfish, 20; and *Palaemonetes*, 9. After the eleventh treatment, a similar haul taken in the same place and in the same manner yielded one *Gambusia* and one *Heterandria.*

A much larger fish population was found in the untreated check pond 11 than in the two treated ponds 12 and 13 (table 2). It is evident that the total fish population was greatly reduced by the treatments in ponds 12 and 13 and that only a fraction of the dead fishes was noted by the weekly inspections. The numbers of fish found dead and the fish remaining at the end of treatment in ponds 12 and 13 possibly indicate that dosages of 0.1 pound of DDT per acre are more toxic than dosages of 0.05 pound per acre.

The other Camp Stewart pond (pond 5) received 22 routine spray treatments at the rate of 0.1 pound of DDT and 1 gallon of fuel oil per acre. This pond is fed by an artesian well, and the water level was kept fairly constant by a connection with a bypass ditch. The first fish kill in this pond was noted after the third treatment, but was less severe than in pond 12. In the latter pond, the recovery of dead fish was several times as great as the number remaining at the end of treatment, whereas in pond 5 the reverse was true. Fish found after individual treatments and at the end of the season are listed in table 2.

Effects of Airplane Application

Studies of the effects of routine airplane larviciding with DDT have been carried on for 3 years in the Savannah Migratory Waterfowl Refuge with the cooperation of the Fish and Wildlife Service. Treatments have been made with a Stearman type PT–17 plane having a 220 horsepower Continental engine. The plane was equipped with a Venturi exhaust generator similar to the one described by Metcalf et al. (*10*) and Krusé and Metcalf (*11*) for the distribution of thermal aerosols and with five nozzles for the application of sprays. These nozzles[2] were placed one at each wing tip, one on the tail, and one on each side of the fuselage inboard of the aileron. When applying the larvicide, the plane flew at 100-foot intervals in parallel lines across the ponds and at an elevation of about 30 feet wherever possible, but trees and other obstacles were given a clearance of about 20 feet. Both sprays and aerosols consisted of a 20 percent solution by weight of technical grade DDT in a methylated naphthalene.[3] The rate of dispersal was approximately 0.1 pound per acre applied at weekly intervals. In 1946, the various areas under test were treated 15 to

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[2] LN-12 of the Spraying System Company, Chicago.

[3] Velsicol NR-70, a product of Velsicol Corporation, Chicago.

17 times, but each area received 20 treatments in each of the 1947 and 1948 seasons.

In 1946, airplane larviciding was conducted on some 815 acres contained in four ponds, two of which (ponds 6 and 2) were sprayed while ponds 3A and 3 received a thermal aerosol application. Two untreated check areas, 4 and 4A, were established in an 850-acre pond about a mile from the nearest treated area. Weekly observations were made 24 to 48 hours after treatment in each of the six areas for the detection of any fish mortality. Fish population checks were made in selected 1-acre plots before treatment in two ponds and after treatment in all but one of the ponds.

In 1947, treatment was restricted to ponds 6 and 3A, the former being sprayed and the latter receiving a thermal aerosol as during 1946. Weekly observations were made for the detection of dead fish in treated and untreated areas, and fish population studies were made in these and in the untreated pond following the season's treatment. In 1948, occasional observations were made to detect any destruction of fish, and population determinations were made at the completion of treatment. All fish population studies were made in the 1-acre plots staked out and used in 1946 in order that direct comparisons could be made.

The 1946 treatments were begun the first week of May. Although all ponds were treated at the same rate (0.1 pound per acre), considerably more DDT reached the water surface in the sprayed ponds than in those receiving the thermal aerosol. In order to determine the actual amount of DDT reaching the water surface in each of the ponds, glass slides measuring 3 by 12 inches were placed above water on small platforms set on stakes which were placed at 30- or 40-foot intervals in a "horseshoe" type pattern across the ponds, 12 to each pond. The glass slides were placed the day before treatment, collected after treatment, and the amount of DDT on them determined colorimetrically. The average amount of DDT found on these 12 slides was considered as the amount reaching the water surface.

Pond 6 received a total of 17 treatments with a total dose for the season of 1.64 pounds of DDT per acre. About 53 percent of this reached the water surface, the amount varying from 37 to 96 percent for individual treatments. The calculated average amount of DDT reaching the water surface per treatment was 0.051 ± 0.004 pound per acre.

Pond 2 was sprayed 16 times with a total dose of 1.54 pounds of DDT, about 75 percent of which reached the water surface. The calculated average amount of DDT reaching the water surface per treatment was 0.070 ± 0.006 pound per acre.

Ponds 3A and 3 each received 15 thermal aerosol treatments with a total applied dose for the season of 1.60 pounds of DDT per acre.

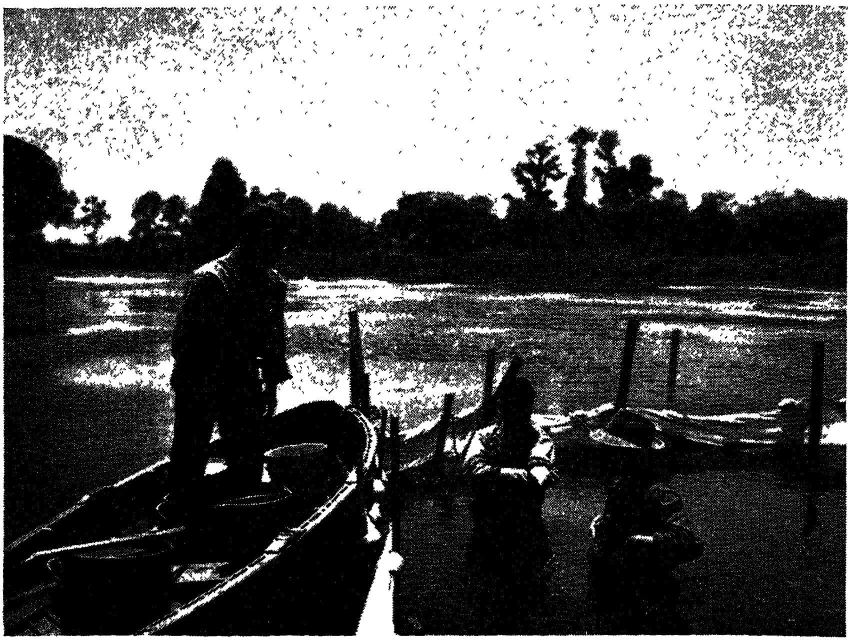

Figure 1. Section of barrier seine enclosing area for fish population study.

In pond 3A, an average of about 10 percent of the applied dosage reached the water surface, the amount per application varying from 0.003 to 0.033 pound per acre. The calculated average amount reaching the water surface per treatment was 0.011±0.0004 pound per acre. In pond 3, an average of about 12 percent of the applied dosage reached the water surface, the calculated amount per treatment varying from 0.005 to 0.031 pound per acre and averaging 0.013±0.001 pound per acre.

Ponds at the Savannah River Migratory Waterfowl Refuge are in diked areas which were formerly rice fields. Water levels within the dikes are controlled by tide gates. Ponds 6 and 2 were flooded in January 1945 and thus had a well-established aquatic fauna at the beginning of the study in 1946. Ponds 2, 3, 4 and 4A were flooded in January 1946. In late March and early April 1946, about 500,000 number one fingerling largemouthed bass were planted in these ponds. The newly flooded ponds were more heavily stocked than the older ones, distribution being as follows: pond 2, 51,000; pond 3A, 17,000; pond 3, 77,000; pond 4, 331,000; and pond 6, 24,000. The water area of each pond is as follows: pond 2, 135 acres; pond 3A, 75 acres; pond 3, 175 acres; pond 4–4A, 850 acres; and pond 6, 135 acres.

Fish population studies were made in ponds 6 and 3A at the beginning of treatment and in these and the other ponds at the completion of treatment, using methods described by Tarzwell (*12*). A square area of about 210 feet on a side was staked out in each pond for the population studies. A barrier seine, consisting of a strip of canvas 6 feet wide, provided with float and lead lines, was placed around these stakes and held in place by stakes placed on the outside (fig. 1). This prevented fish from entering or leaving the area during the population study and helped retain the rotenone used for the poisoning of the fish. The barrier seine was left in place for a week at each location. The fish were poisoned by derris root having a 5 percent rotenone content. The amount of rotenone applied varied from one part in 5 million to one part in 10 million, depending on the water temperature. Fish were picked up immediately after treatment and thereafter as they rose to the surface. All fish taken were separated as to species or genus, then counted and weighed.

Results

Aquatic vegetation, chiefly yellow waterlily and cutgrass, was abundant in pond 6 at the beginning of the study and it increased throughout the period, but one portion of the pond remained relatively free of vegetation. It was in this area where the water averaged 3 to 4 feet deep that the population counts were made. Weekly observations for the detection of dead fish were made throughout the pond. After the first treatment, several dead crabs were seen on the bottom in shallow water near shore. Dead fish were found after the second, fourth, fifth, twelfth, thirteenth, and fourteenth treatments. Total mortality noted was 13 fish, a wood frog, and a water snake. Only a fraction of the dead fish was found, but the total was not significant as indicated by a comparison of the fish population before and after treatment (table 3). These comparisons showed an increase in fish population during the period, and there were no indications that any species was reduced unnaturally.

During the winter of 1946–47, the water level of pond 6 was lowered about 2 feet for the planting of aquatic vegetation. This allowed many fish to escape and reduced the fish population as shown by a fish population study made prior to treatment in April 1947 (table 3). Gross observations made 24 hours after each of the 20 applications made in 1947 showed the following total kills: sunfish, 26; bullheads, 14; golden shiners, 115; flounder, 1; mullet, 1; and frogs, 4. That they were not of great significance is indicated by a slight increase in the fish population during the course of treatment (table 3). The total number of fish taken in the experimental area increased from 1,152 in April to 19,568 in September. This increase clearly shows that the population of the pond had been reduced below the carrying capacity by migration while the gates were open, and that treatment did not prevent an increase in the fish population. No gross observa-

Table 3a. *Effects on fish populations of the routine airplane application of DDT sprays and thermal aerosols at 0.1 pound per acre over a 1- to 3-year period as indicated by fish population studies in 1-acre areas in check and treated ponds at the Savannah River Migratory Waterfowl Refuge before treatment and at the end of each season's operations in 1946, 1947, and 1948*

Species taken	Pond No. 6 sprayed							
	1946				1947			
	Before treatment		After treatment		Before treatment		After treatment	
	Number	Weight	Number	Weight	Number	Weight	Number	Weight
		Pounds		*Pounds*		*Pounds*		*Pounds*
Lepisosteus platyrhincus	13	14.1	31	30.0	4	6.3		
Amia calva	1	3.8	1	1.5			1	4.7
Pomolobus pseudoharengus	2	0.1						
Dorosoma cepedianum	174	53.4	277	95.8				
Brevoortia tyrannus	7	0.1	21	1.0	95	0 3		
Anchoa mitchilli	4		70	0.1				
Erimyzon sucetta sucetta	1	0.6					1	
Cyprinus carpio	1	9.3					4	3 6
Notemigonus crysoleucas bosci	64	1.8	75	1.2	65	2 0	13,178	30 9
N. maculatus							1	
Ictalurus catus	1	0 8	1	0.4	5	7.9	391	4 8
I catus (fingerlings)	210	0 2	29	0.1				
Ameiurus nebulosus marmoratus	2	1.1	38	6.8			19	0.2
A. n. marmoratus (fingerlings)								
A. natalis erebennus					1	1.8		
Anguilla bostoniensis	81	1 5	24	1.6	1		52	0.7
Esox americanus								
E. niger								
Fundulus chrysotus							9	
Gambusia affinis holbrookii								
Heterandria formosa							24	
Aphredoderus sayanus	1						1	
Chaenobryttus coronarius	13	1.0	953	8 0	115	3.1	31	2.9
C. c. (fingerlings)	22	0 1						
Pomoxis annularis	24	1.8	2	1.3				
P. nigro-maculatus								
Centrarchus macropterus								
Enneacanthus gloriosus	1		5	0.1	811	1.3		
Lepomis macrochirus purpurescens	27	6.2	23	5 5	21	0.8		
L. microlophus microlophus	4	0.3	22	3.4				
L. auritus	32	3.9	12	1 7	9	0.5		
Miscellaneous sunfishes	341	0.5	2,560	4.8	14	0.1	5,816	5.0
Huro salmoides	10	2.6	2	2.4				
H. s. (fingerlings)								
Elassoma evergladei								
Labidesthes sicculus vanhyningi								
Micropogon undulatus	2							
Mugil cephalus	24	13.9	14	11 9	8	15 0		
Gobionellus shufeldti	87	0.1	49	0.2	2	0.1		
Hololepis barratti			54	0.1			40	0.1
Trinectes maculatus fasciatus	25	0.3	21	0.1				
Paralichthys lethostigmus	28	13.8	2	0.2	1	1.4		
P. l. (small)	10	0.1						
Totals	1,212	131.4	4,286	178.2	1,152	*40.6	19,568	52.9

*This marked decrease in the fish population is due to a winter drawdown of some 20 inches which allowed the fish to leave the pond.

tions were made in the 1948 season, and the assay made at the close of treatment showed an increase of over 100 pounds of fish per acre.

The number of fish per acre more than doubled from September 1947 to September 1948 (table 3). Practically all species increased, especially the blue-spotted sunfish, *Enneacanthus gloriosus*. Vegetation appeared in the assay area after September 1947, and by September 1948, *Naias* and *Chara* were matted in the bottom. Increase

Table 3b. *Effects on fish populations of the routine airplane application of DDT sprays and thermal aerosols at 0.1 pound per acre over a 1- to 3-year period as indicated by fish population studies in 1-acre areas in check and treated ponds at the Savannah River Migratory Waterfowl Refuge before treatment and at the end of each season's operations in 1946, 1947, and 1948*

Species taken	Pond No 6 Sprayed		Pond No. 3A—Thermal Aerosol							
	1948		1946				1947		1948	
	After treatment		Before treatment		After treatment		After treatment		After treatment	
	Number	Weight	Number	Weight	Number	Weight	Number	Weight	Number	Weight
		Lbs.		*Lbs.*		*Lbs.*		*Lbs.*		*Lbs.*
L. platyrhincus	14	21.7	15	12.9	16	15.1	10	10.0	------	------
A. calva	1	4.4	6	11.4	16	38.3	2	8.3	1	4.8
P. pseudoharengus	------	------	------	------	------	------	------	------	------	------
D. cepedianum	------	------	------	------	------	------	------	------	2,246	29.0
B. tyrannus	------	------	26	.1	------	------	27	.6	------	------
A. mitchilli	------	------	------	------	------	------	------	------	------	------
E. s. sucetta	23	1.1	13	.5	31	9.9	831	22.3	137	50.2
C. carpio	9	50.4	121	.1	------	------	------	------	------	------
N. c. bosci	7,948	47.9	1,555	5.4	224	14.7	14,484	42.9	1,741	9.7
N. maculatus	190	.2	------	------	------	------	------	------	6	------
I. catus	------	------	1	2.4	3	1.1	------	------	------	------
I. catus (fingerlings)	19	.2	------	------	------	------	------	------	------	------
A. n. marmoratus	------	------	38	23.4	21	12.6	32	8.8	12	5.1
A. n. m. (fingerlings)	159	.5	146	.1	------	------	------	------	1,130	8.9
A. n. erebennus	6	------	------	------	------	------	------	------	------	------
A. bostoniensis	56	.4	204	1.1	42	.2	6	.7	7	.2
E. americanus	------	------	6	------	4	.3	16	2.8	------	------
E. niger	------	------	1	------	------	------	------	------	------	------
F. chrysotus	------	------	6	------	356	.4	------	------	------	------
G. a. holbrookii	------	------	4	------	------	------	------	------	------	------
H. formosa	7,130	2.2	2	------	1	------	------	------	------	------
A. sayanus	5	------	8	.1	4	.1	------	------	------	------
C. coronarius	86	3.8	915	16.5	663	6.3	401	17.7	14	1.4
C. c. (fingerlings)	------	------	------	------	------	------	------	------	1,226	4.6
P. annularis	------	------	32	.3	29	1.7	5	.9	502	3.2
P. nigro-maculatus	------	------	3	------	------	------	------	------	------	------
C. macropterus	------	------	------	------	4	------	------	------	6	.3
E. gloriosus	23,321	19.8	966	2.1	1,988	2.3	------	------	254	1.1
L. m. purpurescens	------	------	2,095	52.1	261	6.8	404	34.4	38	.4
L. m. microlophus	124	1.1	305	13.8	740	12.0	------	------	129	1.7
L. auritus	117	.3	234	9.2	1	------	------	------	------	------
Misc. sunfishes	------	------	159	8.1	19,318	24.2	35,755	63.4	253	.3
H. salmoides	------	------	41	11.3	32	7.1	------	------	------	------
H. s. (fingerlings)	------	------	989	.9	103	.2	------	------	------	------
E. evergladei	------	------	4	------	------	------	------	------	------	------
L. s. vanhyningi	------	------	------	------	------	------	------	------	------	------
M. undulatus	------	------	------	------	------	------	------	------	------	------
M. cephalus	------	------	------	------	------	------	------	------	------	------
G. shufeldti	160	.55	76	.5	------	------	------	------	------	------
H. barratti	394	.3	101	.1	14	.1	------	------	14	------
T. m. fasciatus	------	------	6	.1	------	------	------	------	------	------
P. lethostigmus	1	.6	1	.1	------	------	------	------	------	------
P. l. (small)	------	------	------	------	------	------	------	------	4	2.6
Total	39,753	158.4	8,079	172.6	23,871	153.1	51,973	212.8	7,720	123.5

in the number of small sunfish was probably due to the cover provided. The fact that fish numbers increased during the third season of spraying strongly suggests that such applications had little, if any, influence on the fish population of such waters.

Population estimates were not made in pond 2, and gross observations were discontinued after the seventh treatment because of the great increase in sawgrass. During the first seven treatments, the

Table 3c. *Effects on fish populations of the routine airplane application of DDT sprays and thermal aerosols at 0.1 pound per acre over a 1- to 3-year period as indicated by fish population studies in 1-acre areas in check and treated ponds at the Savannah River Migratory Waterfowl Refuge before treatment and at the end of each season's operations in 1946, 1947, and 1948*

Species taken	Pond 3-Aerosol		Pond 4 check					
	1946		1946		1947		1948	
	After treatment		After treatment		After treatment		After treatment	
	Number	Weight	Number	Weight	Number	Weight	Number	Weight
		Pounds		*Pounds*		*Pounds*		*Pounds*
L. platyrhincus	1	3.2	1	3.6	17	23.1	11	6.8
A. calva	3	10.4						
P. pseudoharengus								
D. cepedianum	1,898	100.3	372	23.2				
B. tyrannus								
A. mitchilli								
E. s. sucetta	190	20.9					13	.1
C. carpio								
N. c. bosci	489	12.0	84	2.2			342	.8
N. maculatus	1		2					
I. catus			2	1.9				
I. catus (fingerlings)								
A. n. marmoratus	410	27.3	608	20.4	148	24.0	99	21.4
A. n. m. (fingerlings)								
A. n. erebennus							7	2.6
A. bostoniensis			2	.2	5	7.8	14	.2
E. americanus	1						4	.2
E. niger								
F. chrysotus							2,609	2.8
G. a. holbrookii					541	.6	729	.4
H. formosa								
A. sayanus	95	.9	1				3	
C. coronarius	61	5.4	20	2.8	62	.9	1,264	5.0
C. c. (fingerlings)								
Pomoxis annularis	94	1.1	96	1.9	60	6.1	122	1.0
P. nigro-maculatus								
C. macropterus	265	4.0	79	1.8	39	7.3	3	.4
E. gloriosus	2						3,129	5.2
L. m. purpurescens	48	7.6	5	1.8	1	.3		
L. m. microlophus			12	1.5			10	.2
L. auritus	42	6.5	2	.4				
Misc. sunfishes	45	.2			930	3.0	162	.7
H. salmoides	15	8.0	23	2.0			18	.2
H. s. (fingerlings)	34	1.4			16	.2		
E. evergladei								
L. s. vanhyningi			2					
M. undulatus								
M. cephalus								
G. shufeldti								
H. barratti							313	.1
T. m. fasciatus								
P. lethostigmus								
P. l. (small)								
Totals	3,694	209.2	1,311	63.7	1,819	73.3	8,852	48.1

following reduction was noted: golden shiners, 11; *Gambusia*, 6; flyer sunfish, 4; white crappie, 4; largemouthed bass, 2; pigmy sunfish, 1; and tadpoles, 2. Pond 2 was not sprayed during 1947 or 1948.

Only a few fish were killed in pond 3, which received 15 thermal aerosol applications in 1946. Two gizzard shad were found after the second application and a flyer sunfish after the seventh treatment. A population assay was not made prior to treatment because the pond had been flooded only the previous January. A poisoning study was made and a satisfactory fish population was found after completion

Figure 2. Collecting dead fish from the area within the barrier seine after poisoning.

of the treatments in September 1946. The area selected for the fish population study averaged from 3 to 4 feet deep and had a moderate stand of waterlillies. The population found in this pond was much larger than that found in the untreated check which had been flooded at the same time (table 3).

Pond 3A received 15 thermal aerosol treatments during the 1946 season and 20 each during the 1947 and 1948 seasons. Only three dead fish were found during the 1946 treatments, these being a largemouthed bass fingerling, a golden shiner, and a largemouthed bass found after the sixth, seventh, and eleventh treatments, respectively. During 1947, 12 sunfish, 36 golden shiners, and 2 frogs were found. Routine examinations were not made during 1948.

The area selected for the fish population studies in pond 3A was some distance from shore (fig. 2) and had water which ranged in depth from 3 to 5 feet. Early in 1946 this area had a moderate stand of *Naias* and some *Ceratophyllum* and *Myriophyllum*.

Vegetation increased considerably in the counting area during the summer of 1946, and it became very dense during 1947. This great increase in submergent vegetation, chiefly *Naias*, is probably the main cause for the much larger number of small fishes taken in the falls of 1946 and 1947. During the summer of 1948, vegetation practically disappeared from the study area. In September 1948, it was found that the more open water forms, such as the gizzard shad and chub suckers, had increased in number and weight, but there was a great decrease in the smaller vegetation inhabiting forms, especially the blue-spotted sawfish and the golden shiner.

Although there was some reduction in the weight of fish taken in the fall of 1946, this was probably not significant because there was a considerable increase by the fall of 1947. There was a great increase in the numbers of fish, especially among the golden shiners and blue-spotted sunfish.

The untreated areas 4 and 4A were flooded early in January 1946. These areas were examined at the same time as the treated ponds for the detection of dead fish. In 1946 no dead fish were noted in area 4A, and one golden shiner was found in area 4. During 1947, 47 gizzard shad, 1 golden shiner, and 3 bullheads were found dead in the untreated areas. These routine observations were not made in 1948. Because of the recent filling of the untreated check pond, a pretreatment fish population study was not made in it in 1946. However, post-treatment examinations were made in the falls of 1946, 1947, and 1948 (table 3). Although there was an increase in the fish population in the check during 1947, the standing crop did not approach that found in the treated ponds. This may be due in part to the fact that pond 4 was flooded to a depth of only 18 to 24 inches over much of its area and *Panicum hemitomum* grew densely over much of the pond bottom.

During 1948, vegetation in the population study area increased in density. Waterlilies almost covered the water surface and there was considerable *Naias* under them. Water levels dropped during the 1948 season, and as indicated in table 3, the total weight of fish per acre declined from 73.3 to 48.1 pounds. However, the total numbers of fish increased probably because of the more favorable conditions for small fishes.

Comparative Effects of DDT, DDD, Chlordan, and Toxaphene

In 1946, comparative studies were undertaken to determine effects of routine larviciding on permanent ponds having over 3 feet of water. Each material was tested at three dosages, DDT, DDD, and chlordan at 0.1, 0.05, and 0.025 pound per acre; and Toxaphene at 0.2, 0.1, and 0.05 pound per acre. Each dose was applied to ponds in a given area. The heaviest doses were used on a series of ponds in the Camp Stewart area; the medium doses were applied to a group of ponds in South Carolina along U. S. Highway 17 in the vicinity of Hardeeville, S. C.; and the lightest doses, to four ponds along State Highway 5 north of Hardeeville, S. C. Untreated check ponds were available for each of the series, thus 15 ponds were under treatment and observation. Larvicides were applied at weekly intervals in the form of solutions at the rate of 1 gallon per acre by means of air pressure hand sprayers equipped with atomizing nozzles. The mist sprays were drifted onto the water surface in about 30-foot swaths, a measured quantity of the solution being applied to each pond in accordance with its area.

Each pond was seined before treatment to gain a qualitative and quantitative idea of the fish population. Post-treatment checks were made weekly 24 to 48 hours after spraying for the detection of fish mortality. A total of 14 applications was made. At the completion of treatment, the ponds were poisoned or seined for the determination of residual populations.

In the Camp Stewart area, pond 1 was treated with DDT at the rate of 0.1 pound per acre. This pond, an old borrow pit, had a maximum depth of over 4 feet and an area of 0.3 acre. Vegetation was abundant and there was considerable organic material on much of the pond bottom. Silt is washed into this pond from a nearby railway overpass fill, with resulting muddiness after rains. No dead fish were found during the course of the treatments, and a satisfactory fish population was found after the completion of treatment. On an acre basis, the population was 2,053 fish weighing 182 pounds (table 4), indicating little or no reduction in numbers due to treatment.

Pond 2, which received routine treatments of 0.1 pound of chlordan per acre, is a roadside borrow pit having an area of 0.17 acre, a maximum depth of nearly 5 feet, and an average depth of about 3 feet. The pond, which is fed by road drainage and is usually cloudy, had a sand and mud bottom which was bare of vegetation. Pretreatment seining disclosed many long-eared sunfish, *Lepomis marginatus*. The first fish mortality was noted after the eleventh treatment, and dead fish were observed after each subsequent treatment. Seining after the fourteenth application indicated a marked reduction in the fish population. At the completion of treatment, this pond had a smaller standing population than pond 1, its population on an acre basis being 8,523 fish weighing about 40 pounds.

Pond 3 was treated with Toxaphene at the rate of 0.2 pound per acre. This pond is a straight-sided borrow pit having a maximum water depth of about 10 feet, an average depth of about 9 feet, and an area of 0.44 acre. It had no rooted aquatic vegetation.

No dead fish were noted after the first treatment. There was an extensive loss after the second treatment. Many dead warmouth bass, bluegills, red-breasted sunfish, long-eared sunfish, and *Gambusia* were seen. No live fish were noted after the second treatment and no dead fish were found after the third examination, indicating that the fish had been eliminated. This was later confirmed by poisoning with rotenone.

After the third treatment, no life of any kind other than an alligator was noted in the pond. The water became very clear so that all parts

Table 4a. *Fish found dead at weekly inspections during the treatment period and alive after the 14th weekly application in ponds routinely treated at dosages of 0.1 or 0.05 pound per acre of the indicated larvicides*

Species of Fish	Dosage and larvicides used								
	0.1 pound per acre								
	DDT			Chlordan			Toxaphene		
	Pond No. 1 0.3 acre			Pond No. 2 0.17 acre			Pond No. 9 1.57 acres		
	Number killed	Alive		Number killed	Alive		Number killed	Alive	
		Number	Weight		Number	Weight		Number	Weight
			Pounds			*Pounds*			*Pounds*
Lepisosteus platyrhincus	------	------	------	------	------	------	------	------	------
Amia calva	------	------	------	------	------	------	------	------	------
Erimyzon sucetta sucetta	------	73	16.1	------	------	------	1	------	------
Cyprinus carpio	------	------	------	------	------	------	1	------	------
Notemigonus crysoleucas bosci	------	260	12.4	------	------	------	5	------	------
N. maculatus	------	------	------	------	------	------	------	------	------
Ameiurus nebulosus marmoratus	------	107	19.6	------	2	0.8	------	------	------
A. natalis erebennus	------	7	1.7	------	------	------	2	------	------
Anguilla bostoniensis	------	4	1.4	------	2	0.4	2	------	------
Esox americanus	------	8	1.5	------	------	------	------	------	------
Umbra pygmaea	------	5	0.1	------	------	------	------	------	------
Fundulus chrysotus	------	------	------	------	------	------	------	------	------
F. heteroclitus heteroclitus	------	------	------	------	------	------	------	------	------
F. dispar lineolatus	------	------	------	------	------	------	------	------	------
Gambusia a. holbrookii	------	1	------	2	658	0.7	------	------	------
Heterandria formosa	------	------	------	------	------	------	------	------	------
Aphredoderus sayanus	------	5	0.1	------	------	------	------	------	------
Chaenobryttus coronarius	------	2	0.6	------	7	1.3	21	------	------
Pomoxis annularis	------	------	------	------	------	------	1	------	------
Centrarchus macropterus	------	------	------	------	2	0.1	------	------	------
Acantharchus pomotis	------	------	------	------	------	------	------	------	------
Enneacanthus gloriosus	------	3	0.1	------	------	------	------	------	------
E. obesus	------	2	------	------	------	------	------	------	------
Lepomis macrochirus purpurescens	------	------	------	------	------	------	1	------	------
L. m. microlophus	------	------	------	------	------	------	------	------	------
L. auritus	------	51	0.9	------	------	------	13	------	------
L. marginatus	------	5	0.1	7	695	3.4	------	------	------
L. punctatus punctatus	------	------	------	------	------	------	3	------	------
Miscellaneous sunfishes	------	83	0.1	------	83	0.1	51	------	------
Huro salmoides	------	------	------	------	------	------	6	------	------
Elassoma evergladei	------	------	------	------	------	------	------	------	------
Hololepis barratti	------	------	------	------	------	------	2	------	------
Labidesthes sicculus vanhyningi	------	------	------	------	------	------	18	------	------
Total	0	616	54.7	9	1,449	6.8	126	0	0

of the pond could be seen. This indicated a drastic reduction in the plankton population, and it was some time before it was reestablished.

Pond 4 received routine spray treatments of DDD at 0.1 pound per acre. This pond was a borrow pit having a water area of about 0.84 acre. It had a clay and silt bottom, a maximum depth of about 5 feet, and an average depth of a little less than 3 feet. There were some rooted aquatic plants around the pond edges and the water was fairly clear. During wet periods, the pond had an inlet and outlet and there was considerable flow through it.

The first fish loss was noted at and after the fourteenth treatment. Dead fish found were 2 warmouth bass and 4 redfin pike. Seining previous to and at the completion of treatment indicated a reduction

Table 4b. *Fish found dead at weekly inspections during the treatment period and alive after the 14th weekly application in ponds routinely treated at dosages of 0.1 or 0.05 pound per acre of the indicated larvicides*

Species of fish	Dosage and larvicides used											
	0.05 pound per acre											
	DDT			DDD			Chlordan			Toxaphene		
	Pond No. 7 0.88 acre			Pond No. 8 0.46 acre			Pond No. 10 0.82 acre			Pond No. 12 0.53 acre		
	Number killed	Alive		Number killed	Alive		Number killed	Alive		Number killed	Alive	
		Number	Weight		Number	Weight		Number	Weight		Number	Weight
			Pound			*Pound*			*Pound*			*Pound*
L. platyrhincus					1	4.3		19	7.6			
A. calva								7	11.9			
E. s. sucetta	21	83	4.2		177	25.0		222	27.4		55	11.3
C. carpio												
N. c. bosci								34	0.9			
N. maculatus								6				
A. n. marmoratus					5	1.2		25	5.1		13	0.3
A. n. erebennus		1	1.2		1	0.8		30	3.4		13	3.4
A. bostoniensis		1	2.5		6	1.9		19	1.2		7	0.5
E. americanus	3	5	0.3		30	2.3		20	1.3		3	0.2
Umbra pygmaea								4				
F. chrysotus					11	0.1		40	0.1			
F. h. heteroclitus								36	0.1			
F. dispar lineolatus	1						1				8	
G. a. holbrooki					127	0.2		24		1		
H. formosa								62				
A. sayanus								1				
C. coronarius	4	6	0.1		141	2.3		278	17.5	1	23	0.8
P. annularis	1											
C. macropterus					46	1.3		6	0.5			
A. pomotis		1	0.1					2	0.2			
E. gloriosus		1						73	0.1			
E. obesus					10							
L. m. purpurescens								20	0.6	1		
L. m. microlophus					160	1.0		14	0.6			
L. auritus	5	27	0.5					4	0.3			
L. marginatus	5	7	0.1		21	0.1		6	0.1	2	4	0.1
L. p. punctatus												
Misc. sunfishes					268	0.4		753	0.6		1	0.1
H. salmoides	1							6	6.3	2		
E. evergladei								40				
H. barratti	1				3							
L. s. vanhyningi												
Total	42	132	9.0	0	1,007	40.9	1	1,751	85.8	7	127	16.7

in the fish population. No dead fish were seen in the check pond during the study period.

Pond 7 of the medium dosage series was routinely treated with DDT at a dosage of 0.05 pound per acre. This pond is a straight-sided borrow pit having an area of about 0.88 acre, a maximum depth of 6.5 feet and an average depth of about 5 feet. There was very little aquatic vegetation in the pond, and the water was turbid.

Dead fish were first found in the pond after the third treatment and thereafter following the fifth, eighth, tenth, eleventh, twelfth, thirteenth, and fourteenth treatments (table 4). At the end of treatment, the population in this pond on an acre basis was 150 fish weighing 10.2 pounds, indicating a considerable reduction.

Pond 8 closely resembled pond 7. It was one-fourth mile away, had the same general surroundings, type of banks and bottom, and type of water. It differed only in size and depth, having an area of about 0.46 acre, a maximum depth of 6 feet, and an average depth of 4 to 4½ feet. No dead fish were found in this pond during the period of treatment with DDD at 0.05 pound per acre (table 4). On an acre basis the standing fish population was 2,190 fish weighing 88 pounds. It is inferred that the fish population in this pond was not reduced as much as it was in pond 7, and that DDD is not as toxic to fish as is DDT at comparable dosages.

Pond 9 was routinely treated with Toxaphene at the rate of 0.1 pound per acre. This pond had a rather barren clay bottom and clear water, an area of 1.57 acres, a maximum depth of 6 feet, and an average depth of 3 to 4 feet. Over 100 dead fish were found after the first treatment, and all fish were killed by the first three treatments, as indicated by poisoning the water with rotenone (table 4). At 0.1 pound per acre, Toxaphene is exceedingly harmful to fishlife.

Pond 10 received routine treatments with chlordan at a dosage of 0.05 pound per acre. This pond was richer in flora than the others of the series. It was ringed with *Eleocharis* and had considerable submerged vegetation. It had an area of 0.82 acre, a maximum depth of 5 feet, and an average depth of about 2½ feet. Only one dead fish was found during the period of treatment, a starhead minnow, *Fundulus dispar lineolatus*, which was found after the ninth application. The surviving fish population was 2,128, weighing 104 pounds, per acre, indicating that any reduction in fish numbers due to treatment must have been small. No mortality was noted in the check pond for this series.

During the period of study, no dead fish were found in the untreated pond accompanying the low-dosage series. Pond 11 was routinely treated at the rate of 0.025 pound per acre with chlordan with no noted change in the status of the fish population.

Pond 12 was routinely treated with 0.05 pound of Toxaphene per acre. This is a long narrow pond having an area of 0.53 acre and an average depth of 2½ feet. There was no emergent vegetation, but a narrow-leafed *Potamogeton* covered much of the bottom. Fish were common with the long-eared sunfish being dominant. Bluegills, warmouth bass, spotted sunfish, *Lepomis punctatus punctatus*, the blue-spotted sunfish, *Enneacanthus gloriosus*, and the largemouthed bass were also present.

Dead fish were noted at the time of the fifth treatment (table 4). At the end of treatment half of the pond was poisoned. On an acre basis, the remaining fish population was about 508 fish weighing 65 pounds. Observations, fish seining, and poisoning indicated a considerable reduction of the fish population in this pond. Toxaphene is believed too toxic to fish for use as a mosquito larvicide where fish are important.

Pond 13 received routine treatments with DDT at 0.025 pound per acre. This pond was a long narrow pit having an area of about 0.76 acre and an average depth of 2½ feet. Surface vegetation was lacking and the water was turbid. In pretreatment seining the following fish were taken: bluegill (*Lepomis macrochirus purpurescens*), redbreast sunfish (*Lepomis auritus*), bluespot sunfish (*Enneacanthus gloriosus*), largemouthed bass (*Huro salmoides*), warmouth bass (*Chaenobryttus coronarius*), redfin pike (*Esox americanus*), gambusia (*Gambusia affinis holbrookii*), chain pickerel (*Esox niger*). No dead fish were noted during the period of the study and seining at the completion of the test indicated no significant population changes.

Pond 14 was routinely treated with DDD at 0.025 pound per acre. This pond had an area of 2 acres, a maximum depth of about 3½ feet, clear water, and abundant submerged aquatic vegetation. Fish were common at the beginning of the study. Three dead fish were found in the after-treatment inspections: a *Gambusia* after the ninth treatment, a redbreasted sunfish, *Lepomis auritus*, and a redfin pike,

Table 5. *Results of the routine application of DDT and DDD at specified dosages to 9 ponds over a period of 18 weeks*

Pond	Treatment	Time of first kill	Dead fishes found		Total kill
1	Check		0		0
2	Check		0		0
3	0.05 pound of DDT per acre.	Seventh week	*Erimyzon sucetta sucetta*	10	23
			Notropis maculatus	2	
			Ameiurus nebulosus marmoratus	2	
			Esox americanus	1	
			Centrachus macropterus	1	
			Chaenobryttus coronarius	7	
4	0.05 pound of DDT per acre.	Seventh week	*Ameiurus nebulosus marmoratus*	1	22
			Esox americanus	9	
			Chaenobryttus coronarius	3	
			Lepomis macrochirus purpurescens	3	
			Huro salmoides	6	
5	0.05 pound of DDD per acre.	Sixth week	*Ameiurus nebulosus marmoratus*	2	7
			Centrarchus macropterus	2	
			Lepomis macrochirus purpurescens	1	
			Huro salmoides	2	
6	0.05 pound of DDD per acre.	Tenth week	*Ameiurus nebulosus marmoratus*	5	9
			Centrarchus macropterus	2	
			Huro salmoides	2	
7	0.075 pound of DDD per acre.	Ninth week	*Ameiurus nebulosus marmoratus*	5	15
			Esox americanus	1	
			Centrarchus macropterus	8	
			Huro salmoides	1	
8	0.10 pound of DDD per acre.	Seventh week	*Ameiurus nebulosus marmoratus*	1	8
			Esox americanus	3	
			Chaenobryttus coronarius	3	
			Lepomis auritus	1	
9	0.10 pound of DDD per acre.	Ninth week	*Ameiurus nebulosos marmoratus*	1	8
			Centrarchus macropterus	6	
			Huro salmoides	1	

Esox americanus, after the twelfth treatment. Post-treatment seining indicated no great change in the fish population. The following fish were taken: largemouthed bass, chub suckers, bluegills, red-breasted sunfish, blue-spotted sunfish, and top minnows.

Further comparisons of the effects of DDT and DDD on fish were carried out in nine ponds during 1947. Two of these were retained as untreated checks, two received routine applications of 0.05 pound of DDT per acre, while the remaining received dosages of 0.05, 0.075, and 0.1 pound of DDD per acre. The period of study and observation extended from August 28, 1947, to March 25, 1948, with the treated ponds receiving 18 applications between August 28 and December 22, 1947. Weekly inspections were made for the detection of dead fish. Larger and earlier losses occurred in the ponds receiving DDT (table 5). DDT treatments at 0.05 pound per acre resulted in greater reductions than those produced by DDD at 0.075 or 0.10 pound per acre. In view of these and other findings, it is concluded that DDT is more toxic to fish than DDD.

Summary and Conclusions

Hand Applications of DDT in Small Ponds

Tests with a number of DDT solvents indicated that some were much more toxic to aquatic organisms than others. Isopropyl alcohol, ethyl alcohol, and acetone were less toxic than kerosene, which in turn was less toxic than No. 2 fuel oil when the application rate was 1 or 2 gallons per acre. Velsicol NR–70 was the most toxic solvent tested. Although DDT-kerosene solutions are somewhat less toxic than DDT-No. 2 fuel oil solutions, these differences are probably not significant enough to justify changes in large-scale operations if applications are at the rate of 1 gallon per acre or less. Routine treatments with 1 gallon per acre of fuel oil alone caused no observed fish harm over a period of 14 weeks.

Stable DDT emulsions were much more toxic to amphibians, fishes, and the larger crustacea than were DDT solutions or dusts; therefore, DDT emulsions are not recommended for larviciding in areas having valuable wildlife. Single applications of DDT solutions applied at dosages of 0.4 pound or more of DDT per acre are toxic to fish and result in mortality 1 to 4 days after treatment. Results similar to these have been reported by Surber (*13*). Single applications of DDT solutions at dosages of 0.1, 0.05, and 0.025 pound per acre, and dusts at 0.1 or 0.2 pound of DDT per acre did not kill fish.

In routine hand applications, DDT dusts at dosages of 0.1 to 0.2 pound per acre had little effect on fishes, and it is believed that DDT dusts can be applied routinely at 0.1 pound per acre with little or no significant harm to aquatic organisms.

Routine application of DDT solutions at a dosage of 0.1 pound of DDT per surface acre generally resulted in serious kills of fish after the tenth application, and with continued use, practically eliminated the fish population in ponds. The type of pond greatly influences the effects of the DDT. In one pond, the first loss was observed after the second treatment, while in another, it was not observed during 14 routine applications. Fish mortality occurred earliest in barren sand bottom ponds and was smallest in clay- or silt-bottom pools having considerable vegetation and organic material on the bottom and which received muddy water after rains. Generally, however, routine weekly treatments applied from the ground at 0.1 pound of DDT per acre are significantly harmful to fish and are not recommended for malaria mosquito control where fish are important. No dead fish were observed in ponds routinely treated with 0.025 pound of DDT per acre.

Routine treatments with solutions at dosages of 0.05 pound of DDT per acre resulted in harm to fish after the third to the eighteenth treatments. Usually the mortality first occurred between the tenth and thirteenth treatments, and increased significantly after the latter. With continued treatment of the total surface area at 0.05 pound of DDT per acre, the fish population in some ponds is drastically reduced. In larger, deeper bodies of water where only the marginal or problem areas are treated, probably no significant harm would result. Even though some does occur, it will be localized, and the total harmful effects will be slight because of the short period of treatment and the limited extent of the areas treated. Furthermore, in the small ponds where losses do occur, fishery values are slight because of the small size and intermittent nature of the ponds. For adequate malaria control, oil solutions applied at doses of 0.05 pound DDT and 1 gallon of solution per acre, or dusts applied at 0.1 pound of DDT per acre, are generally recommended. Aquatic vegetation is not noticeably inhibited by these treatments.

Airplane Application

At equal discharge rates of 0.1 pound per acre, the amount of DDT reaching the water surface during airplane larviciding is about five times as much for sprays as for thermal aerosols. In tests made in four ponds, two being sprayed and two receiving a thermal aerosol, the sprayed ponds received a calculated average of 53 percent and 76 percent, respectively, of the material discharged during 17 and 16 spray applications; whereas the aerosol ponds received a calculated average of 10 percent and 12 percent, respectively, of the amount discharged from the plane during 15 applications.

Observed fish mortality during the first and succeeding 2 years of treatment with DDT sprays and aerosols was not significant. Population studies made before treatment and at the close of each year's treatment in untreated and treated areas for 3 years disclosed no significant decrease in the standing population or any unusual change in its composition attributable to treatments. Hess and Keener (*14*) have reported no harmful effects following 1 year's treatment with thermal aerosol in an area of Wheeler Reservoir. From studies made on the consequences of airplane larviciding during the past 3 years, it is concluded that DDT sprays or thermal aerosols can be routinely applied at a dosage of 0.1 pound per acre for 3 years without harm to the fish population.

Toxic Effects of DDT and Other Insecticides

Studies of the effects of DDT and certain other new insecticides indicate that they are all toxic to fishes if used in large doses. With DDT, the type of pond or water in which it is used greatly influences the onset and severity of toxic action on fishes. Vegetation, organic material, type of water, and silt or turbidity are all factors influencing this action. Crabs, crayfish, amphipods, isopods, and *Palaemonetes* are very sensitive to DDT, being considerably more so than fishes. Among the fishes, some of the Centrarchidae are the first to be affected, especially the bluegill, *Lepomis macrochirus purpurescens*, and the flyer, *Centrarchus macropterus*. Several other fishes are affected almost at the same time, among these being the golden shiner, *Notemigonus crysoleucas bosci*, the chub sucker, *Erimyzon sucetta sucetta;* and the black and brown bullheads, *Ameiurus nebulosus marmoratus*, and *Ameiurus nebulosus erebennus*. The blue-spotted sunfish, *Enneacanthus gloriosus*, seems to be quite resistant, while the eel, *Anguilla bostoniensis*, was the most resistant of the fishes studied. Although top minnows were among the first fish to be killed, they continued to be present during the period of treatment and were in evidence when most other fish had been eliminated. A few frogs and snakes were killed by routine treatment at dosages of 0.1 and 0.05 pound of DDT per acre.

At routine dosages of 0.1 pound per acre, DDD, chlordan, and DDT are toxic to fish and will significantly reduce the population of ponds. At dosages of 0.05 pound per acre, DDT appears to be somewhat more toxic than chlordan or DDD. Studies carried on in 1947 indicated that DDD was considerably less toxic to fish than DDT. These three insecticides appear to have no significant effect on the fish population at dosages of 0.025 pound per acre. Toxaphene was found to be very toxic to fishes, giving complete kills at 0.2 and 0.1 pound per acre after two and three applications in deep ponds. Kills were obtained at dosages of less than 1 part in 27 million, indicating that this material is as toxic or more toxic to fish than rotenone and may be useful as a substitute for it in fish management work.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED FEBRUARY 4, 1950

For the current week, major increases are noted in reported cases of communicable diseases for measles (from 4,580 to 6,230), meningococcal meningitis (from 79 to 83), pneumonia (from 2,104 to 2,493), and scarlet fever (from 1,860 to 1,934).

The increase in reported cases of measles occurred in all geographic divisions and ranged from an increase of 13 cases in the Pacific Division to 364 cases in the West North Central. Thirty-four States and the District of Columbia also reported increases ranging from 1 in Rhode Island to 390 cases of measles in North Carolina (from 158 to 548). Michigan reported 1,224 cases, the largest number of cases in any State for the week. However, the total for the current week is lower than the 5-year (1945–49) median, and the cumulative total for the calendar year (23,129) is lower than the corresponding 5-year (1945–49) median of 28,282. During this 5-year period, the highest corresponding cumulative total was 69,293 for 1949.

The increase in reported cases of scarlet fever for the current week over last week is small and the total is well under the 5-year (1945–49) median. The cumulative total for the year is 8,100 cases which is also less than the corresponding 5-year median of 13,144.

Decreases in reported cases for the current week in the Nation are noted in diphtheria (199 to 180), infectious encephalitis (10 to 5), influenza (6,512 to 5,973), poliomyelitis (114 to 106), tularemia (25 to 15), typhoid and paratyphoid fever (50 to 46), and whooping cough (2,888 to 2,570).

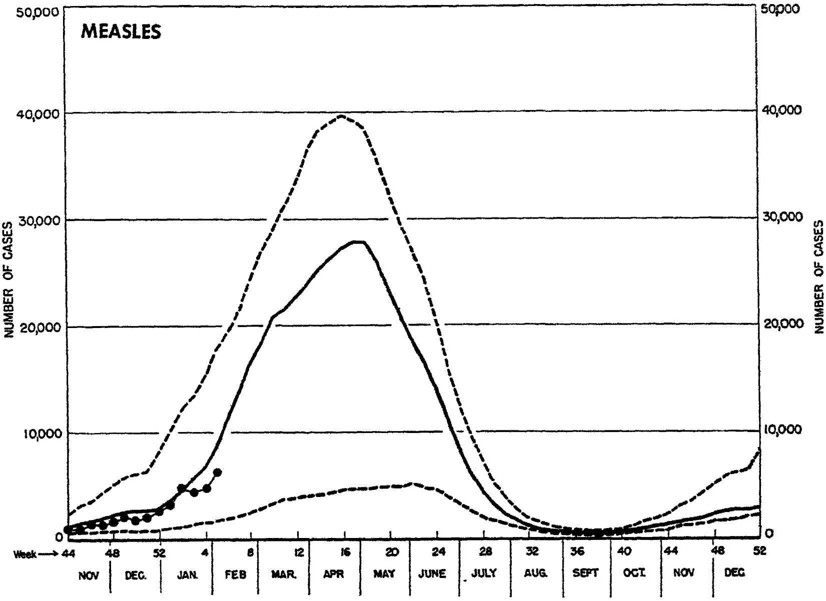
Reported cases of meningococcal meningitis are close to the 5-year (1945–49) median for the week. The total reported to date is 435 which is the same as the median figure for the 1945–49 period. Pennsylvania reported the largest increase, from 2 to 12 cases for the week.

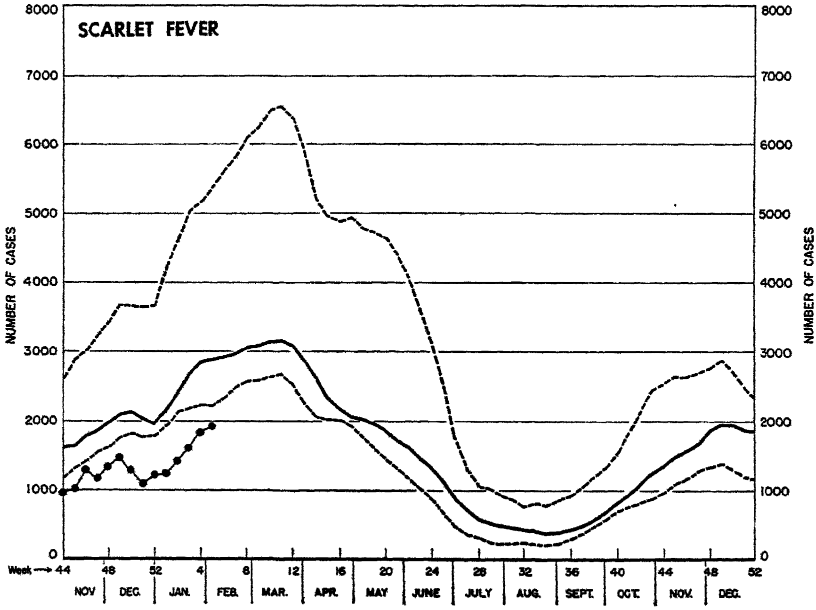
Although reported incidence of influenza decreased for the Nation, the following States showed major increases: Alabama (287 to 556), Arizona (124 to 189), Illinois (1 to 186), Nebraska (0 to 33), Texas (2,831 to 3,114), and Wisconsin (11 to 39). Georgia reported a decrease from 1,400 last week to 349 for the current week.

Two cases of Rocky Mountain spotted fever were reported in Nevada; one case each of smallpox was reported in Missouri and Wisconsin; and one case of psittacosis was reported in Steubenville, Ohio.

Communicable Disease Charts

All reporting States, November 1949 through February 4, 1950





The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the five preceding years. The solid line is a median figure for the five preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks, 1949–50.

Telegraphic case reports from State health officers for week ended February 4, 1950

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	---	---	---	40	1	16	---	---	13	---	---	---	38	---
New Hampshire	---	---	---	1	---	1	---	---	3	---	---	---	6	---
Vermont	---	---	---	3	---	2	---	---	5	---	---	---	27	---
Massachusetts	4	---	---	145	2	---	---	---	115	---	---	1	114	---
Rhode Island	1	---	---	1	---	5	---	---	7	---	---	---	14	---
Connecticut	---	---	---	83	1	59	2	---	25	---	---	---	87	---
MIDDLE ATLANTIC														
New York	11	1	[1] 2	371	6	370	6	---	[2] 180	---	---	2	272	10
New Jersey	---	---	5	529	2	65	2	---	37	---	---	6	163	1
Pennsylvania	12	---	---	134	12	68	1	---	118	---	---	5	214	---
EAST NORTH CENTRAL														
Ohio	7	---	4	159	1	60	3	---	244	---	---	2	185	2
Indiana	5	---	12	85	---	6	---	---	60	---	1	---	35	[3] 20
Illinois	---	---	186	96	6	96	2	---	87	---	2	1	107	4
Michigan	3	1	3	1,224	4	73	10	---	152	---	---	---	213	3
Wisconsin	1	---	39	205	1	23	1	---	94	1	---	---	139	---
WEST NORTH CENTRAL														
Minnesota	2	---	---	103	4	9	---	---	28	---	---	1	17	---
Iowa	---	---	---	321	1	1	3	---	20	---	---	---	7	2
Missouri	5	---	---	6	3	3	1	---	16	1	---	1	11	---
North Dakota	---	1	12	7	---	---	---	---	3	---	---	---	6	---
South Dakota	---	---	---	26	---	---	---	---	5	---	---	---	4	---
Nebraska	1	---	33	194	1	12	1	---	14	---	---	---	7	---
Kansas	1	---	---	86	1	42	---	---	27	---	---	---	9	---
SOUTH ATLANTIC														
Delaware	---	---	---	16	---	---	---	---	1	---	---	---	9	---
Maryland	5	---	4	14	2	33	2	---	27	---	1	1	84	---
District of Columbia	1	---	---	87	1	15	---	---	3	---	---	---	4	---
Virginia	11	---	854	18	1	90	2	---	20	---	---	2	42	---
West Virginia	3	---	43	240	1	6	1	---	20	---	---	3	66	6

South Carolina	4	--------	36	85	1	13	1	--------	4	--------	--------	--------	5	8
Georgia	11	--------	349	27	--------	109	--------	--------	26	--------	--------	1	3	12
Florida	2	--------	6	33	--------	11	7	--------	12	--------	1	1	6	--------
EAST SOUTH CENTRAL														
Kentucky	8	--------	3	24	4	15	4	--------	32	--------	1	1	31	12
Tennessee	6	--------	128	80	4	--------	--------	--------	42	--------	1	2	27	11
Alabama	7	--------	556	60	3	172	2	--------	11	--------	--------	2	54	10
Mississippi	9	--------	13	52	2	37	3	--------	15	--------	2	--------	6	--------
WEST SOUTH CENTRAL														
Arkansas	7	--------	144	3	1	76	--------	--------	12	--------	1	1	17	2
Louisiana	2	--------	7	65	1	39	--------	--------	--------	--------	--------	2	13	--------
Oklahoma	4	--------	117	13	--------	39	2	--------	17	--------	1	1	25	--------
Texas	21	--------	3,114	181	10	714	21	--------	56	--------	1	2	179	24
MOUNTAIN														
Montana	--------	--------	13	77	--------	1	--------	--------	22	--------	1	1	3	--------
Idaho	1	--------	7	10	--------	7	7	--------	9	--------	--------	--------	--------	--------
Wyoming	--------	--------	--------	6	--------	2	1	--------	6	--------	--------	--------	--------	--------
Colorado	--------	1	31	126	1	61	1	--------	13	--------	--------	--------	12	8
New Mexico	--------	--------	--------	11	--------	11	--------	--------	3	--------	--------	1	14	--------
Arizona	2	--------	189	115	--------	24	--------	--------	17	--------	--------	--------	29	--------
Utah	1	--------	1	213	--------	8	--------	--------	3	--------	--------	--------	18	--------
Nevada	--------	--------	--------	1	--------	1	--------	2	--------	--------	--------	--------	--------	--------
PACIFIC														
Washington	1	--------	--------	72	--------	--------	1	--------	70	--------	--------	--------	40	--------
Oregon	1	--------	28	29	--------	33	1	--------	24	--------	--------	--------	14	--------
California	8	1	34	205	5	65	14	--------	162	--------	--------	3	113	--------
Total	180	5	5,973	6,230	83	2,493	106	2	1,934	2	15	46	2,570	135
Median, 1945-49	302	10	5,170	7,997	85	--------	47	--------	2,970	6	21	48	2,289	--------
Year to date 5 weeks	899	50	25,450	23,129	435	11,343	584	6	8,100	8	123	201	11,469	661
Median, 1945-49	1,579	32	22,511	28,282	435	--------	248	1	13,144	23	154	205	11,388	--------
Seasonal low week ends	(27th) July 9	--------	(30th) July 30	(35th) Sept. 3	(37th) Sept. 17	--------	(11th) Mar. 19	--------	(32d) Aug. 13	(35th) Sept. 3	--------	(11th) Mar. 19	(39th) Oct. 1	--------
Since seasonal low week	5,170	--------	55,980	42,259	1,348	--------	42,066	--------	24,539	15	--------	3,358	33,005	--------
Median, 1944-45 to 1948-49	9,145	--------	58,781	54,406	1,396	--------	19,203	--------	39,079	77	--------	3,747	35,251	--------

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[1] New York City only. [2] Including cases reported as streptococcal sore throat. [3] Report for 2 weeks.

Psittacosis: 1 case was reported from Stuebenville, Ohio, Feb. 3. Alaska: Influenza 10, measles 1. Hawaii: Influenza 95.

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended January 14, 1950.—Cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	1		61	2	416	405	80	58	108	147	1,278
Diphtheria			4	19	19	2					44
Dysentery, bacillary						1				3	4
German measles			7		14	110	18		274	114	537
Influenza			41			23	2				66
Measles			11		336	415	64	97	152	209	1,284
Meningitis, meningococcal			1			3					4
Mumps			92	1	71	549	9	16	80	326	1,144
Poliomyelitis									1		1
Scarlet fever	3		5	4	87	32	13	3	102	6	255
Tuberculosis (all forms)	15		3	10	67	19	17	2	3	86	222
Typhoid and paratyphoid fever					7	1	3			2	13
Undulant fever					3	2					5
Venereal diseases:											
Gonorrhea	7		4	12	84	66	19	25	54	80	351
Syphilis	3		2	2	33	34	6	2	1	13	96
Whooping cough	3		4		142	51		13	1	18	232

JAPAN

Notifiable diseases—5 weeks ended December 31, 1949, and accumulated totals for the year to date.—Certain notifiable diseases have been reported in Japan as follows:

Disease	5 weeks ended Dec. 31, 1949		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Anthrax	1		11	
Dengue fever			5	
Diarrhea, infectious	26		770	
Diphtheria	1,771	179	14,835	1,393
Dysentery, unspecified	425	136	23,988	6,937
Encephalitis, Japanese "B"	5	2	1,309	466
Gonorrhea	14,840		181,143	
Influenza	829		2,777	
Leprosy	65		784	
Malaria	85	11	3,732	72
Measles	3,695		165,261	
Meningitis, epidemic	74	20	1,476	436
Paratyphoid fever	123	8	2,219	113
Pneumonia	16,895		139,433	
Poliomyelitis	186		3,133	
Puerperal infection	90		965	
Rabies	8		76	
Scarlet fever	566	4	4,661	63
Smallpox	1	1	124	13
Syphilis	13,947		188,150	
Tetanus	180		2,195	
Trachoma	10,354		176,078	
Tuberculosis	37,130		469,059	
Typhoid fever	467	53	6,488	814
Typhus fever	14		115	6
Whooping cough	10,135		126,632	

NOTE.—The above figures have been adjusted to include delayed and corrected reports.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

(Cases)

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January-November 1949	December 1949	January 1950—week ended—			
			7	14	21	28
ASIA						
Burma	[1] 252	1				
Bassein	183					
Moulmein	[1] 3	1				
Rangoon	[1] 3					
Ceylon	2					
Trincomalee	2					
China:						
Amoy	[2] 1					
India	90, 846	6, 599	377	545	116	135
Ahmedabad	1					
Allahabad	17					
Bombay	[3] 6					
Calcutta	[1] 5, 282	230	44	42	91	135
Cawnpore	190					
Cocanada	12				2	
Cuddalore	2					
Lucknow	[1] 34					
Madras	433	1		2	1	
Masulipatam	1					
Nagpur	44					
Negapatam	26	3	5	14	19	
New Delhi	[1] 20					
Tuticorin	14				3	
India (French):						
Karikal	55					
Pondicherry	100					
Indochina (French):						
Cambodia	45					
Cochinchina	11					
Pakistan	28, 150	[4] 1, 127				
Chittagong	75					
Dacca	[5] 101					
Lahore	[1] 24					
Siam (Thailand)	9					
Bangkok	8					

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[1] Includes imported cases. [2] Suspected. [3] Imported. [4] Dec. 1-10, 1949. [5] Includes 2 deaths reported as cases.

PLAGUE

(Cases)

(P=present)

AFRICA						
Basutoland	42					
Belgian Congo	16	2				
Costermansville Province	4	2				
Stanleyville Province	[1] 12					
British East Africa:						
Kenya	5					
Tanganyika	15					
Madagascar	124	5		[2] 2		
Tananarive	6					
Rhodesia, Northern	2					
Union of South Africa	[3] 94	6				
Cape Province	[4] [5] 48	[6] [7] 1				
Orange Free State	[8] [9] 14					
Southwest Africa	P	[6] 3				
Transvaal	4					

See footnotes at end of table.

PLAGUE—Continued

Place	January-November 1949	December 1949	January 1950—week ended—			
			7	14	21	28
ASIA						
Burma	[10] 460	40				
Mandalay	1					
Moulmein	[10] 6					
Pegu Town		1				
Rangoon	[10] 8					
Yenangyaung Town		1				
China:						
Chahar Province	[11] 69					
Chekiang Province	7					
Wenchow	7					
Fukien Province	20					
Kiangsi Province	9					
India	31,232	[12] 997				
Indochina (French)	128		4		1	
Annam	69		4			
Cambodia	24				1	
Cochinchina	[13] 32					
Laos	3					
Java	651	278				
Jogjakarta Residency	618	277	[14] 17	[14] 9	[14] 19	
Siam (Thailand)	179	4	1			
EUROPE						
Portugal: Azores	5					
SOUTH AMERICA						
Brazil:						
Bahia State	13					
Ceara State	9					
Pernambuco State	19					
Ecuador:						
Loja Province	12	7				
Peru:						
Lambayeque Department	10					
Libertad Department	3					
Lima Department	8					
Piura Department	10					
Tumbes Department	1					
Venezuela:						
Aragua State	2					
OCEANIA						
Hawaii Territory	1					

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[1] Includes 2 cases of pneumonic plague. [2] Jan. 11–20, 1950. [3] Includes suspected cases. [4] Includes 16 suspected cases. [5] Includes 8 cases of pneumonic plague. [6] Suspected. [7] Pneumonic plague. [8] Includes 3 suspected cases. [9] Includes 1 case of pneumonic plague. [10] Includes imported cases. [11] Outbreak July–November 1949. First appeared in bubonic form, but later became pneumonic. [12] For week ended Dec. 3, 1949, only. [13] Includes 7 cases of penumonic plague. [14] In Jogjakarta City.

SMALLPOX

(Cases)

(P=present)

Place	January-November 1949	December 1949	7	14	21	28
AFRICA						
Algeria	276	25				
Angola	748					
Basutoland	1					
Bechuanaland	4					
Belgian Congo	2,040					
British East Africa:						
Kenya	25					
Nyasaland	[1] 1,158	94	5			
Tanganyika	891	33	2			
Uganda	40					
Cameroon (British)	24					
Cameroon (French)	70					
Dahomey	[1] 429	7		12	21	
Egypt	4					
Eritrea	1					
Ethiopia	12					
French Equatorial Africa	411	1				
French Guinea	1					
French West Africa: Haute Volta	121			2		

See footnotes at end of table.

Place	January–November 1949	December 1949	January 1950—week ended—			
			7	14	21	28
AFRICA—continued						
Gambia	58					
Gold Coast	53					
Ivory Coast	339	17		8	23	
Liberia	3					
Morocco (French)	11	6				
Morocco (International Zone)	2					
Morocco (Spanish Zone)	3					
Mozambique	334	34				
Nigeria	8, 507	[2] 57		[2] 9		
Niger Territory	760	129		33		
Portuguese Guinea	1					
Rhodesia:						
Northern	11	11				
Southern	769					
Senegal	16					
Sierra Leone	114	25				
Sudan (Anglo-Egyptian)	[3] 243	15	1	1	[4] 1	
Sudan (French)	159			1		
Togo (French)	148	7				
Tunisia	1					
Union of South Africa	1, 318	30	P			
ASIA						
Afghanistan	241					
Arabia	[3] 83	[3] 201	65	30		
Bahrein Islands	64	4	1	1	1	
Burma	[3] 1, 992	413	89	135	79	
Ceylon	[4] 2					
China	976	16				
India	66, 463	[5] 868	296	362	425	
India (French): **Yanaon**	1					
India (Portuguese)	224					
Indochina (French)	2, 529	220	16	16	21	
Iran	371	98				
Iraq	610	139	[3] 9	14	11	2
Israel	5					
Japan	123	1				
Korea (Southern)	8, 948	3				
Lebanon	[3] 143	2				
Malay States (Federated)	46					
Manchuria: **Port Arthur**	9					
Netherlands Indies:						
Java	12, 769	132	43	45	81	
Riouw Archipelago	2					
Sumatra	[3] 218	7		2		
Pakistan	4, 002	198	18	7	11	
Palestine	188					
Philippine Islands:						
Mindoro Island	11					
Romblon Island	[4] 4					
Tablas Island	2					
Portuguese Timor	4					
Siam (Thailand)	103	7	83	130		
Straits Settlements. **Singapore**	[3] 2					
Syria	627	41	2		1	
Transjordan	196	3		17		
Turkey. (See Turkey in Europe.)						
EUROPE						
Belgium	1					
Germany (U. S. Zone)	3					
Great Britain: England and Wales	[3] 22					
Italy	[6] 99					
Portugal	7	1				
Spain	3					
Canary Islands	6					
Turkey	92					
NORTH AMERICA						
Cuba: **Habana**	[3] 6					
Guatemala	4					
Mexico	759	1				

See footnotes at end of table.

SMALLPOX—Continued

Place	January-November 1949	December 1949	January 1950—week ended—			
			7	14	21	28
SOUTH AMERICA						
Argentina	349	40	9	---	---	---
Bolivia	35	---	---	---	---	---
Brazil	352	19	2	[7] 2	---	---
Chile	2	---	---	---	---	---
Colombia	2,615	10	---	---	---	---
Ecuador	660	3	---	---	---	---
Paraguay	12	---	---	---	---	---
Peru	[1] 3,769	---	---	---	---	---
Uruguay	2	[7] 8	---	---	---	---
Venezuela	2,335	4	---	1	---	---
OCEANIA						
Guam	2	---	---	---	---	---

---

[1] Corrected figure. [2] In the port of Lagos. [3] Includes imported cases. [4] Imported. [5] For week ended Dec. 3, 1949, only. [6] Includes 95 cases of varioloid reported in Rome Jan. 1-June 10, 1949. [7] Nov. 27-Dec. 17, 1949.

TYPHUS FEVER*

(Cases)

(P=present)

AFRICA						
Algeria	86	9	---	---	---	---
Basutoland	27	---	---	---	---	---
Belgian Congo	[1] 42	---	---	---	---	---
British East Africa:						
Kenya	76	---	---	---	---	---
Nyasaland	4	---	---	---	---	---
Tanganyika	2	[2] 1	---	---	---	---
Egypt	182	---	---	---	---	---
Eritrea	74	7	2	---	---	---
Ethiopia	647	---	---	---	---	---
Gold Coast	[3] 6	---	---	---	---	---
Libya	186	11	2	---	---	---
Cyrenaica	20	2	[4] 2	---	---	---
Tripolitania	166	9	---	---	---	---
Madagascar: **Tananarive**	[4] 10	---	---	---	---	---
Morocco (French)	19	1	---	[5] 1	---	---
Morocco (Spanish)	[3] 46	---	---	---	---	---
Sierra Leone	[1] 2	---	---	---	---	---
Tunisia	[3] 72	[1 6] 1	---	---	---	---
Union of South Africa	187	3	P	---	---	---
ASIA						
Afghanistan	1,595	---	---	---	---	---
Arabia. **Aden**	[7] 2	---	---	---	---	---
Burma	5	---	---	---	---	---
Ceylon: **Colombo**	[1] 6	---	---	---	---	---
China	59	5	---	---	---	---
India	237	---	---	---	---	---
India (Portuguese)	72	---	---	---	---	---
Indochina (French)	21	3	---	---	---	---
Iran	174	11	---	---	---	---
Iraq	88	18	3	---	3	1
Japan	102	13	---	---	---	---
Korea (Southern)	[3] 1,182	3	---	---	---	---
Lebanon	[3] 4	---	---	---	---	---
Pakistan	593	36	---	2	2	---
Palestine	114	---	---	---	---	---
Philippine Islands: **Manila**	[1] 1	---	---	---	---	---
Straits Settlements: **Singapore**	[3] 5	---	---	---	---	---
Syria	[3] 27	3	---	1	---	---
Transjordan	63	6	2	---	---	---
Turkey. (See Turkey in Europe.)						

See footnotes at end of table.

TYPHUS FEVER—Continued

Place	January-November 1949	December 1949	January 1950—week ended—			
			7	14	21	28
EUROPE						
Belgium	[3][7] 5					
Bulgaria	393					
Czechoslovakia	22					
France	5					
Great Britain:						
England and Wales	[1][7] 4					
Malta and Gozo	[1] 30	1				
Greece	71	2				
Hungary	20					
Italy	[3] 27					
Sicily	28					
Poland	341					
Portugal	6					
Rumania	417					
Spain	7	1				
Turkey	211	28	7	8	3	2
Yugoslavia	207	13				
NORTH AMERICA						
Bahama Islands: **Nassau**	[1] 1					
Costa Rica [1]	51					
Cuba [1]	[8] 4					
Guatemala	50					
Jamaica [1]	19					
Mexico	[3] 234	12		[1] 2		
Panama Canal Zone [1]	12					
Panama (Republic)	[1] 5					
Puerto Rico [1]	44					
SOUTH AMERICA						
Argentina	[1] 2					
Bolivia	53					
Brazil	[3] 6					
Chile	[3] 359	17	2			
Colombia	[3] 2,505					
Curacao	[1] 5					
Ecuador	[3] 330					
Peru	1,103					
Venezuela	[3] 120					
OCEANIA						
Australia [1]	125	8	1			
Hawaii Territory [1]	[8] 16	1				

---

*Reports from some areas are probably murine type, while others include both murine and louse-borne types.

[1] Murine type. [2] In Dar es Salaam. [3] Includes murine type. [4] Suspected. [5] Jan. 1–10, 1950. [6] In Tunis. [7] Includes imported cases. [8] Corrected figure.

YELLOW FEVER

(C=cases; D=deaths)

Place		January-November 1949	December 1949	7	14	21	28
AFRICA							
Belgian Congo:							
Stanleyville Province	D	5					
French Equatorial Africa:							
Bangui	D	1					
Gold Coast	C	26		1			
Accra	D	1					
Ankobra Ferry	D			[1] 1			
Birim District	C	[2] 3					
Komenda Village [3]	D	1					
Nkwanta Dunkwa Area	D	1					
Oda Area:							
Akwatia	C	[4] 5					
Atiankama	C	[5] 1					
Bawdua	C	[5] 3					
Esuboni	C	[5] 3					
Oseikrome Village	D	1					
Winneba Area:							
Apam	D	1					
Akukuom	D	1					
Nyakrom	C	[6] 5					

See footnotes at end of table.

YELLOW FEVER—Continued

Place	January-November 1949	December 1949	January 1950—week ended—			
			7	14	21	28
AFRICA—continued						
Nigeria:						
Kaduna ——D	1					
Lagos ——D	[7] 2					
Sierra Leone:						
Freetown ——D		[7] 1				
Komadugu District ——C		[8] 1				
Sudan (French):						
Bamako ——D	[5] 1					
NORTH AMERICA						
Panama:						
Colon Province ——D	3					
Pacora ——C	[9] 8					
SOUTH AMERICA						
Bolivia:						
Chiquisaca Department ——C						[10] 30
Brazil:						
Acre Territory ——D	1					
Amazonas State ——D	1					
Para State ——D	3					
Ecuador:						
Napo Pastaza Province ——D	1					
Peru:						
Cuzco Department ——D	3					
San Martin Department ——D	1					

[1] Onset Jan. 1, 1950; died Jan. 5, 1950, at hospital in Bogoso. [2] Includes 2 suspected cases. [3] Near seaport of Sekondi. [4] Includes 1 suspected case. [5] Suspected. [6] Includes 2 suspected cases (1 fatal), and 3 fatal confirmed cases. [7] Imported. [8] Confirmed. [9] Reported Jan. 15, 1949 Date of occurrence Nov. 11-Dec. 30, 1948; 5 cases (all fatal) confirmed, 3 nonfatal suspected cases. [10] Information dated Feb. 2, 1950: Outbreak reported in districts of Monteagudo Muyupampa, and Rio Azero, Chiquisaca Department, Bolivia. 12 deaths reported with the above 30 cases.

DEATHS DURING WEEK ENDED FEBRUARY 4, 1950

	Week ended Feb. 4, 1950	Corresponding week, 1949
Data for 94 large cities of the United States:		
Total deaths	9,282	9,838
Median for 3 prior years	9,838	
Total deaths, first 5 weeks of year	48,324	49,952
Deaths under 1 year of age	632	734
Median for 3 prior years	754	
Deaths under 1 year of age, first 5 weeks of year	3,159	3,479
Data from industrial insurance companies:		
Policies in force	69,855,244	70,633,498
Number of death claims	14,846	14,328
Death claims for 1,000 policies in force, annual rate	11.1	10.6
Death claims per 1,000 policies, first 5 weeks of year, annual rate	10.2	9.8

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

VOLUME 65 MARCH 3, 1950 NUMBER 9

TUBERCULOSIS CONTROL ISSUE NO. 49

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Tuberculosis Control in Philadelphia
Social Services for the Tuberculous, I

1798

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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Public Health Reports

Vol. 65 • MARCH 3, 1950 • *No. 9*

— Editorial —

An End to Lip Service

In the past, many communities have examined themselves for countless reasons. Some have attempted to learn whether adequate services are being provided for a single group such as children or unmarried mothers or new citizens. Others have explored their medical or recreation or school facilities. Still others have gone so far as to review the entire health or welfare structure of the community.

In November of 1948, a special study was undertaken in Philadelphia to determine how medical, nursing, and social services available to the people of that city contribute to the control of tuberculosis. The study was undertaken by three professional workers—a physician, a nurse, and a medical social worker—all working toward a common objective and with a singleness of purpose. Despite three very distinct approaches their findings were integrated into a single study from which the health authorities of Philadelphia hope to learn a great deal about the organization and effectiveness of tuberculosis control in that community.

One phase of this study—the place of social services in the over-all program of tuberculosis control—is of especial interest. Such a study is unique, and, we believe, almost without precedent. The object here was to determine the significance of the city's social service activities to the health program. The emphasis actually is upon their impact on a health problem. That health and social agencies should together contribute to the welfare of the citizen at whom the efforts of both are directed would seem more than obvious. But, are these efforts so organized, and so employed that the potential recipient does indeed gain maximum benefit?

For years we have given lip service to "social factors" in tuberculosis. It is time to assign this lip service to history and move ahead.

This is the forty-ninth of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which appear in the first week of each month. The series began with the Mar. 1, 1946, issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

It is time to inquire, as did the people of Philadelphia: How is the effectiveness of the tuberculosis program influenced by social services?

The manner in which any community sets about to find answers to these basic questions, as well as the answers themselves, is, of course, of interest and value to other localities concerned with effective tuberculosis control. Therefore, because we feel that much can be learned from such an experience, we are presenting in this issue the study of Philadelphia's social service activities which relate to tuberculosis patients and their families. The specific details about the 43 hospitals, clinics, social agencies, and rehabilitation agencies who participated in the study have been reported to those agencies and are not published here. The significance of this presentation lies in its demonstration of how a community attempts to determine whether it is meeting the social needs of a group with a specific health problem—in this instance the group affected by tuberculosis. The Social Service Section in this issue is only one part of this community review; the Medical and Nursing Sections will be published in the future.

The publication of this material has been approved by the official and voluntary agencies which provided the information for the report. They are thus making a contribution not only to their own community but also to other areas with a similar complexity of health and social agencies and similar problems in tuberculosis control. Such an attitude on the part of the Philadelphia health and social agency personnel bespeaks their courage and far-sightedness. The Division has been pleased to be associated with this project and with the people of Philadelphia who made this study possible.

ROBT. J. ANDERSON, *Medical Director,*
Chief, Division of Tuberculosis.

Study of Tuberculosis Control in Philadelphia

Introduction

By Russell E. Teague, M. D., M. P. H.*

Leaders in tuberculosis control in the City of Philadelphia have been concerned for some time about the increasing number of tuberculosis patients on the waiting list for admission to hospitals. Early in 1948, the Philadelphia County Medical Society and the Department of Public Health requested the United States Public Health Service to make a survey of the tuberculosis control facilities and activities in the city.

The survey was designed to include all hospitals having beds for the care of tuberculous patients. It also included representative tuberculosis clinics of both public and private agencies and all public health agencies offering tuberculosis nursing service to patients in the Philadelphia area. Medical social services in these settings and the social services offered through public and private social agencies were studied.

The City

Philadelphia is one of the oldest cities in the Nation and is a large industrial center. There are about 2 million people living in an area of 130 square miles. About 85 percent of the people are white and 15 percent are nonwhite; the population is almost equally divided by sex. Late in 1948 and early in 1949, when the material for this report was being gathered, employment conditions in general in Philadelphia were good, but as elsewhere in the Nation, unemployment was rising. As in most municipalities at this time, housing presented one of the most severe problems both in terms of adequacy and standards, a fact of which all Philadelphians are very much aware and a situation which they are working hard to correct. The city itself, large, complex and heavily industrial, may well be typical of many other large industrial centers.

The Extent of the Problem

The best available index of the tuberculosis problem in Philadelphia is the mortality rate. There has been a consistent gradual decline in tuberculosis mortality since 1870, when the rate was 341.7 per 100,000 population, to 1948 when it was 44 per 100,000 population. The actual number of deaths was highest in 1918 when 3,763 deaths occurred, and lowest in 1948 with 907 deaths. The death rate declined from 49.1 per 100,000 inhabitants in 1947 to 44 per 100,000 in 1948. There has been a 25 percent reduction in the tuberculosis death rate during the last 10 years. In 1948, 12.5 percent of all deaths from tuberculosis were extra-pulmonary. Tuberculous meningitis was responsible for 31 deaths, miliary tuberculosis for 30, caseous tuberculosis for 13, other types for 26 deaths.

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Although the 907 deaths from tuberculosis in 1948 were far fewer than the 3,763 of 1918, this number of deaths plus the fact that nearly 3,000 new cases were reported, indicates a problem of great magnitude. Moreover, among Philadelphians who died locally from tuberculosis an average of 37 percent were never reported as living cases. In 1948 alone, more than 300 of the tuberculosis deaths of Philadelphians in the city were never reported to the health department while they were alive. This is approximately 5 to 10 percent higher than the average for other areas for which this information is available; and indicates a need for more effective case finding and reporting. All told, the central registry of the Division of Tuberculosis of the health department has records on approximately 13,000 cases, almost 8,000 of which are active or questionably active.

A third index of the tuberculosis problem in Philadelphia is the rate at which susceptible individuals are being infected with the tubercle bacillus (incidence of infection). A few comparative studies are available that indicate a marked drop in tuberculin sensitivity in children. In 1928, a tuberculin test survey among school children showed that 25.0 percent of the children 6 years of age and 52.7 at age 16 were positive to the first dose of tuberculin (0.01 mgm. O. T.). In 1948, 20 years later, 4.2 percent of the children entering school at the age of 6 and 16.4 percent at age 16 years were found to be positive to an equivalent dose (0.00002 mgm. PPD). These studies indicate that there has been a marked drop in the incidence of tuberculous infection in children in the past 20 years.

The fourth index of tuberculosis in Philadelphia is the actual prevalence of the disease as found from X-ray surveys of large groups of the population. In the 5-year period, 1943–48, over 400,000 individuals of all ages were surveyed with mass radiographic methods. An analysis of all groups indicates that approximately 1.7 percent of the adult population examined had significant tuberculous lesions of the chest, and 0.4 percent had active tuberculosis. The prevalence of tuberculosis varies with the group being X-rayed. The prevalence in industrial groups was somewhat higher, 2.7 percent, and among food handlers was higher still, 3.1 percent. In one special study, persons with diabetes were found to have a much higher rate of prevalence. (8.4 percent in diabetics against 4.2 percent in a nondiabetic group with similar age, sex, and race distribution.)[1]

It can be seen, then, that a problem of such magnitude demands solution, and many agencies in Philadelphia, both public and private, have worked successfully for many years to bring about the decline from 3,100 deaths in 1900 to 907 tuberculosis deaths in 1948.

What facilities for bringing about this much control have been operating in Philadelphia?

Medical Resources

Health Department

The Division of Tuberculosis in the city health department, with a part-time tuberculosis control officer, is officially responsible for tuberculosis control in Philadelphia. The Division was started in 1923 and has gradually expanded. The budget for its program stems from the city and Federal Government. Of the total of $384,361.52, the United States Public Health Service provides $170,000.

The Division is the biggest single tuberculosis resource in Philadelphia. Its work is supplemented by the work of the Philadelphia Tuberculosis Association, the private hospitals and clinics and the private physicians. Supported by all the facilities in the city, the Division of Tuberculosis through its clinics, case-finding program, and supervision of cases attempts to insure that all cases of tuberculosis in Philadelphia are found, diagnosed, and placed under medical treatment.

Clinics

The Division of Tuberculosis operates 12 clinics in different parts of the city. These are staffed by chest physicians working on a part-time basis. Two clinic physicians (part time) also supervise care of tuberculosis patients at the Philadelphia Hospital for Contagious Diseases, and one clinic physician is assigned to the tuberculous inmates at Holmsburg Prison.

The clinics provide X-ray, complete physical examination, and laboratory service for the diagnosis of tuberculosis. They also provide collapse therapy and assist patients in being admitted to hospitals and sanatoriums. The quarters of the clinics include a waiting room for patients, a room for nurses, and adequate examining rooms. There are filing cabinets for records, washbasins, toilets for men and women, and medical equipment and supplies. These are the minimum quarters; some of the clinics are much larger.

All clinics are open at least 4 hours a week. Records are kept of each patient and reports are sent to the Division of Tuberculosis, the Association of Tuberculosis Clinics, and the Social Service Exchange. The large number of persons found in mass photofluorographic surveys who have pulmonary abnormalities has placed an additional burden on the city chest clinics. Occasionally, immediate hospitalization is arranged for patients found in these surveys who have advanced tuberculosis. In the majority of instances, painstaking clinical, bacteriological and X-ray studies are necessary to determine whether the patient may continue his usual activities or whether hospital or sanatorium care is advisable.

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[1] Tuberculosis Among Diabetics—1949. Katherine R. Boucot et al. To be published.

The 12 city chest clinics and 13 voluntary clinics admitted, examined and treated 36,821 individuals who made 52,627 clinic visits in 1948. In addition 26,685 home visits to families were made by clinic public health nurses. The sharp rise in the number of new patients diagnosed as tuberculous is attributable to the influence of the mass surveys. This is indicated by the fact that in 1948 the number of new patients diagnosed as having minimal and moderately advanced tuberculosis increased greatly, whereas the number with far advanced tuberculosis was smaller. The increase in the number of tuberculin tests performed, in the number of X-ray examinations made, and especially in the number of sputum examinations is again evidence of the more elaborate study necessary particularly in patients discovered in X-ray surveys.

A clinical laboratory located in the quarters of the Municipal Laboratories at Front and Luzerne Streets has been equipped and staffed with a technician. This is for the purpose of examining the gastric contents of individuals who are suspected of having pulmonary tuberculosis and who are unable to submit a specimen of sputum. Heretofore, this service was not available to the patients in the city chest clinics except in rare instances when clinic physicians were able to make special arrangements to have it done for them.

It is anticipated that efficiency can be further increased by the consolidation of some of the clinics, since experience indicates the superiority of a few large, well staffed clinics with closer supervision of medical and nursing personnel.

Nursing

The nursing staff of the Division of Tuberculosis now consists of a supervising public health nurse, five assistant supervising public health nurses and 42 staff nurses. Nine of the nursing staff are not available for the routine activities of the city chest clinics but are assigned to other projects either of this Division or of affiliated agencies. Two nurses are assigned to the Central Cooperative Clinic, two nurses to the special project at The Henry Phipps Institute, one nurse to each of the X-ray units, one to the BCG vaccination research project and one to the Starr Centre Association. The nurses assigned to the city chest clinics made 18,369 visits during 1948 to families and to other agencies in behalf of patients. This represented a reduction in the number of visits in comparison with the year 1947 and is an indication of the need for increased nursing personnel in the field. Conferences of the nursing staff were held throughout the year. There were 6 general staff conferences, 4 district conferences and 16 supervisors' conferences. Monthly conferences are held of the nursing supervisors and the medical supervisor of the clinics.

Case Finding

The mass survey program of the Division of Tuberculosis is directed by a supervisor of X-ray surveys who is assisted by a clinic physician. Their duties include not only the administration of the X-ray units but also supervision of the follow-up for patients whose survey films disclose possible tuberculosis. Three part-time roentgenologists are employed by this Division and are assigned to the interpretation of films at each of the units. About 150,000 small film X-rays are taken each year in this program. Four general hospitals are operating routine admission X-ray units in the admitting rooms. All out-patients as well as in-patients are routinely screened for tuberculosis.

Case Registry

The Division of Tuberculosis operates a central case registry at its headquarters. Information is exchanged with all the local clinics and hospitals daily. The registry is designed to make readily available complete statistical data to guide and supervise the entire program.

Central Cooperative Clinic

The Central Cooperative Clinic is under the joint auspices of the Division of Tuberculosis, the Public Health Service, the Philadelphia Tuberculosis and Health Association, and Temple University. This is a special clinic, now in its third year of operation of a 5-year research project for the follow-up of 500 patients (and their contacts) found in X-ray surveys.

The Henry Phipps Institute

The cornerstone of advance in medical knowledge and treatment of the tuberculous is research in the laboratory and action research in a dispensary set-up. The Henry Phipps Institute is widely known for its scientific contribution to knowledge on the subject of the cause and treatment of tuberculosis.

Financed by the income of The Henry Phipps Memorial Fund of the University of Pennsylvania, by the Community Chest, by foundation funds for special research projects, and the Philadelphia Department of Public Health, it operates a large dispensary for the care of tuberculous patients living in a section of Philadelphia specified by arrangement with the Department of Public Health. Care includes medical supervision of patients by full- and part-time physicians in the Institute and includes all modern facilities for the diagnosis of tuberculosis. Collapse therapy is administered on an out-patient basis. Twenty public health nurses render a nursing and health supervision service in the homes of tuberculous patients attending the dispensaries, with additional careful supervision of all members of the household. The integration of its services is apparent through close coordination with health and welfare agencies in Philadelphia, the city hospital institutions, the State sanatoria and other local and State institutions concerned with the care of tuberculosis.

Hospital Facilities

Official

The city health department provides hospitalization for about 518 patients in two hospitals—Philadelphia General and Municipal Contagious. In addition, about 400 Philadelphia patients are in three State sanatoria. This number is determined on a population basis. In addition, the State Department of Health, through the State Division of Tuberculosis, provides hospital care for patients transferred to local hospitals for surgery. All told there are about 918 public beds available for Philadelphians, and these form the principal resource for hospitalization.

Veterans' Facilities

Veterans comprise approximately 10 percent of the tuberculosis case load in Philadelphia. They are eligible for medical care in any Veterans' Administration Hospital in the country and veterans whose disability is service-connected may obtain prompt care in most instances. Nonservice-connected cases are placed on waiting lists. The regional office of the Veterans' Administration located in Philadelphia manages the placement of veterans with tuberculosis and works closely with the health department and local clinics.

Naval Hospital

This hospital, maintained by the United States Navy, has 31 beds for tuberculous patients who serve in the Navy.

General Hospitals

By and large, these hospitals do not have a specific number of beds for tuberculosis as the patients have been admitted for special purposes, such as teaching, or surgery, or are discovered on other wards. Consequently, they give care to relatively few tuberculosis patients. A total of 45 beds are provided.

The general hospitals operate under a variety of auspices; some are administered by universities, some are private or partially endowed. Most of these hospitals receive State aid but other sources of income vary.

In addition to giving general medical treatment, they conduct teaching and research, isolation, and have other special interests. Some have specially designated numbers of beds for tuberculosis patients but others do not knowingly admit them except for surgery or on an emergency basis.

Specialized Tuberculosis Hospitals

There are six private specialized tuberculosis hospitals within the Philadelphia area, with bed capacities ranging from 76 to 188, providing a total of 474 beds. These hospitals give care to tuberculosis patients only. Surgery is available in one of these institutions. In addition to Philadelphians who receive care in these hospitals, there is an average of 150 residents of surrounding counties who come to these six institutions.

Philadelphia Tuberculosis and Health Association

In any successful community effort to control tuberculosis, the local tuberculosis association has a significant role. It is in a position to take up new technical procedures more rapidly than official agencies which generally operate under both statutory and financial restrictions. As long ago as 1892, individuals recognized this opportunity for positive action in advancing the health of the people and formed, in Philadelphia, The Penn State Tuberculosis Society, the first tuberculosis association in the country.

Since its first major emphasis on tuberculosis control, its program has broadened to include general health. Operating with a staff of 55 employees, the Philadelphia Tuberculosis and Health Association expends approximately $250,000 yearly in the following categories: (1) Development of health education programs with planning for tuberculous patient education; public education in relation to tuberculosis and general health; participation with five other special interest agencies in a coordinated health education program; (2) demonstration projects such as case finding by mass X-ray surveys; (3) rehabilitation and other patient services which cannot be provided through existing service agencies; (4) subsidy of The Henry Phipps Institute's Negro Bureau which employs eight Negro nurses and two Negro physicians, the primary purpose of this project being the training of professional workers of the Negro race in this field; (5) supplementing of the clinic services at The Henry Phipps Institute; (6) statistical studies and research in special projects related to tuberculosis; (7) collecting and reporting data for the Association of Tuberculosis Clinics; (8) providing patient information service.

Mass radiography, undertaken as one of its pioneering demonstrations, has been proven to be an essential in adequate case finding. It is at this point, with value proved, that this function should be completely taken over by the Department of Public Health which is now carrying this in part. This delegation of total responsibility to the official agency would release almost one-fourth of the Philadelphia Tuberculosis and Health Association's budget for the development and expansion of its health education, rehabilitation and social service programs.

Since rehabilitation plays such an important part in tuberculosis control, it is vital that this part of the control program be developed and considerably broadened. A recent study of 305 tuberculosis patients rehabilitated during a 10-year period draws conclusions which give promise of tremendous possibilities in this field. Demonstration to official agencies of the intrinsic value of this phase of tuberculosis control is the next necessary step.

The success of the whole tuberculosis control program in Philadelphia is in the balance, at present due to an acute shortage of hospital and sanatorium beds for the treatment and isolation of tuberculosis patients. Admissions to the tuberculosis division of the Philadelphia General Hospital were 1,005 during 1948 as compared to 1,225 in 1947. Admissions to the State Sanatoria fell from the already low figure of 242 in 1947 to 155 in 1948 and 115 in 1949. There has been no significant extension of other facilities for hospital or sanatorium care, either under private or Federal auspices. There is a waiting list of over 527 city residents with active tuberculosis and with positive sputum registered with the Division of Tuberculosis. These patients constitute a danger to the community.

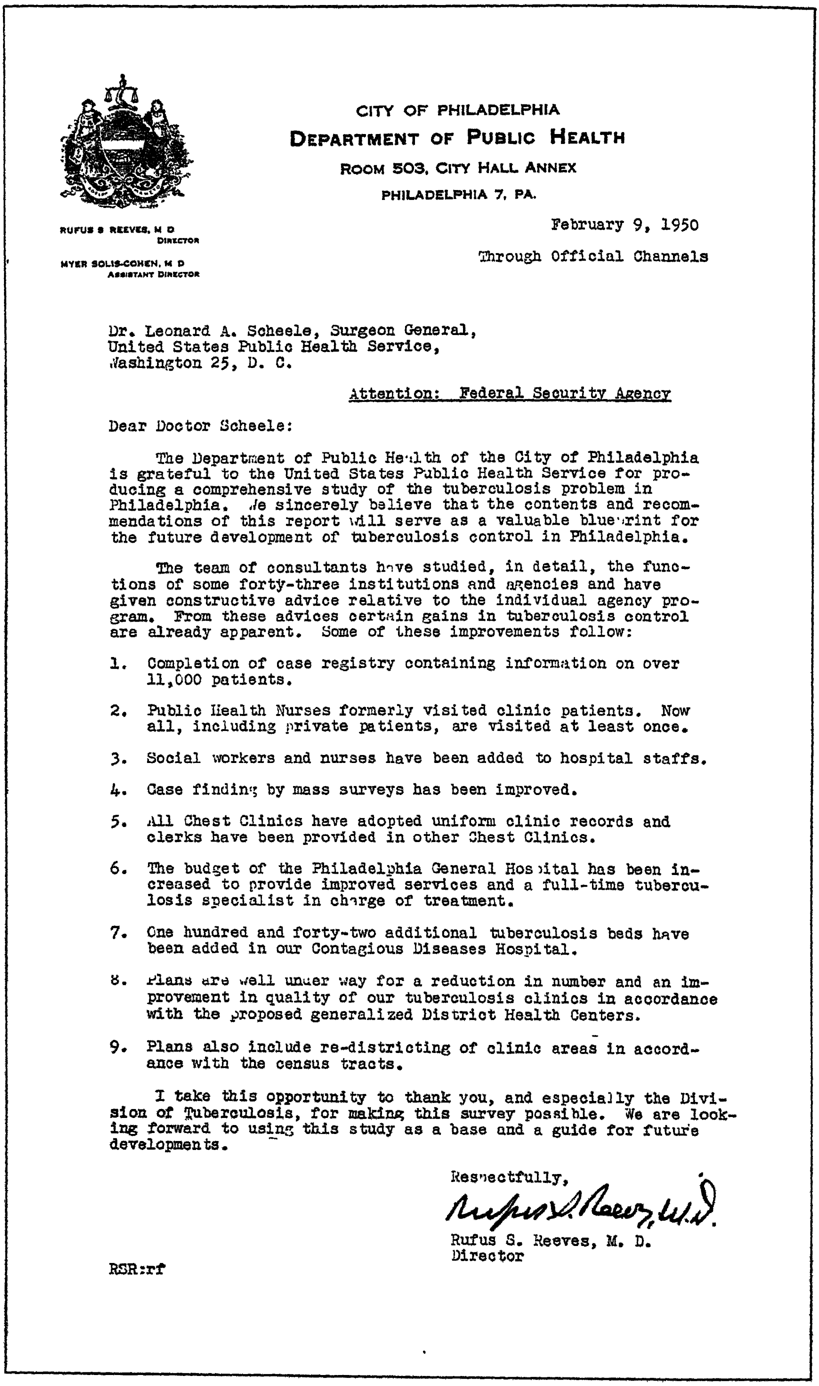
A cause for special concern is the fact that most of the overcrowded hospitals and sanatoria have felt it expedient to restrict admission to patients with positive sputum. Although this practice is justifiable as an emergency procedure, this makes adequate treatment impossible for patients with minimal tuberculosis and threatens to vitiate the value of the mass survey program which detects so many patients with minimal disease who would have a favorable prognosis with proper sanatorium treatment. It is urgent that plans be made for increased hospital and sanatorium facilities.

As a temporary expedient to accommodate some of the sputum positive patients who have been kept at home while awaiting admission to hospitals and sanatoria, the Department of Public Health has authorized use of the Philadelphia Hospital for Contagious Diseases and has recently provided equipment and personnel in order to make possible the use of 239 beds for the care of pulmonary tuberculosis. Extensive alterations and reorganization have been necessary in order to arrange for adequate care of a larger number of tuberculous patients at this hospital.

The hospitalization of tuberculous children has long been a major problem in this city. In order to facilitate transfer or admission of these children to institutions, application for admission must now be made to the Division of Tuberculosis of the Department of Public Health.

Twice in relatively recent years studies of the tuberculosis control program in Philadelphia have been made by an outside group. In 1922, such a study resulted in the establishment, during the following year, of a tuberculosis control division in the Department of Public Health and the establishment of city tuberculosis clinics instead of State clinics. Again in 1929, another survey resulted in improved case-finding programs, diagnostic clinics, and nursing follow-up.

This study, undertaken at the request of the official health agency is a comprehensive inquiry into all phases of the problem.



CITY OF PHILADELPHIA
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RUFUS S. REEVES, M.D.
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ASSISTANT DIRECTOR

February 9, 1950

Through Official Channels

Dr. Leonard A. Scheele, Surgeon General,
United States Public Health Service,
Washington 25, D. C.

Attention: Federal Security Agency

Dear Doctor Scheele:

The Department of Public Health of the City of Philadelphia is grateful to the United States Public Health Service for producing a comprehensive study of the tuberculosis problem in Philadelphia. We sincerely believe that the contents and recommendations of this report will serve as a valuable blueprint for the future development of tuberculosis control in Philadelphia.

The team of consultants have studied, in detail, the functions of some forty-three institutions and agencies and have given constructive advice relative to the individual agency program. From these advices certain gains in tuberculosis control are already apparent. Some of these improvements follow:

1. Completion of case registry containing information on over 11,000 patients.
2. Public Health Nurses formerly visited clinic patients. Now all, including private patients, are visited at least once.
3. Social workers and nurses have been added to hospital staffs.
4. Case finding by mass surveys has been improved.
5. All Chest Clinics have adopted uniform clinic records and clerks have been provided in other Chest Clinics.
6. The budget of the Philadelphia General Hospital has been increased to provide improved services and a full-time tuberculosis specialist in charge of treatment.
7. One hundred and forty-two additional tuberculosis beds have been added in our Contagious Diseases Hospital.
8. Plans are well under way for a reduction in number and an improvement in quality of our tuberculosis clinics in accordance with the proposed generalized District Health Centers.
9. Plans also include re-districting of clinic areas in accordance with the census tracts.

I take this opportunity to thank you, and especially the Division of Tuberculosis, for making this survey possible. We are looking forward to using this study as a base and a guide for future developments.

Respectfully,

Rufus S. Reeves, M.D.

Rufus S. Reeves, M. D.
Director

RSR:rf

I. Social Services for the Tuberculous and Their Families

By Ruth B. Taylor, M. A.*

In order to achieve the objectives of any tuberculosis control program it is necessary to place all the men and women who have the disease under appropriate medical care. It is well known that all people must make certain social, as well as physical, adjustments to the disease and to medical treatment. Some make these adjustments without assistance, but many people need help. Because a patient's ability to benefit from medical care to the fullest extent depends upon his adjustment to the disease and the proper resolution of his social problems, the amount of social services and of rehabilitation services available in the community directly affect the control of tuberculosis.

Studying tuberculosis control facilities in a community therefore requires reviewing the social services offered to tuberculosis patients in the hospitals, clinics, and social agencies and the services of the rehabilitation facilities. During such a review, certain questions must be kept in mind.

Are there medical social services in the hospitals and clinics to help patients with the emotional and social problems of adjustment to illness? Are there social resources in the community? Are both fully utilized? To what extent are these resources successful in helping contribute to the tuberculosis program of the community? When medical facilities are inadequate, are social facilities further strained? When social facilities are inadequate, is an additional burden thrust upon hospitals and clinics? In an effort to answer these and other questions, and to develop an approach to any analysis of the fundamental social needs of any community attempting to control tuberculosis this study was made, and this report is presented.

Findings

The one fact which appears to prevail almost universally throughout Philadelphia's tuberculosis control efforts is a lack of integrated medical and social planning. This is evident in many areas of activity and in many practices of the agencies either directly or indirectly involved in tuberculosis control work.

It is possible that this lack of integrated planning may be attributed to an incomplete awareness of the social problems associated with tuberculosis. This is indicated by the frequently encountered comment that public and private social agencies are meeting all the needs of tuberculosis patients; this, however, is not at all the case, as may be seen in the report of detailed findings which appears later in this paper.

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* Medical Social Consultant, Division of Tuberculosis, Public Health Service.

The following summarizes the principal evidences of the lack of integrated planning, as observed in the course of this study.

No Medical Social Workers in Health Department

Although the need for medical social workers in local health departments has become increasingly clear, there are no social workers employed by the health department. This, despite the fact that the total tuberculosis case load is estimated at 8,000 in the health department. Direct case-work services are therefore not available to patients either at the point of diagnosis or during the period subsequent to hospitalization, when some of the most serious problems come to light.

Inadequate Social Service in Hospitals and Hospital Clinics

Medical social service began to develop in hospitals nearly 50 years ago. There are well-established patterns of service and the principal objective is to help the individual meet those personal, social, and emotional problems which prevent his making the fullest possible use of the medical services offered him.

In Philadelphia, several of the general and specialized hospitals have well-developed medical social services. But in Philadelphia, as in nearly every other city in the Nation, the development of medical social service in tuberculosis hospitals has been slower; as a rule, in most places, the tuberculosis hospitals are less well staffed, both in numbers and in professional training. There is, however, a growing awareness of the importance of caring for social factors in tuberculosis, and this is leading to an increased use of medical social workers in tuberculosis medical settings, as well as improvements in qualifications of personnel. More medical social workers are definitely required for service in tuberculosis hospitals.

Inadequate Professional Standards

The term "social worker" is used very loosely in the Philadelphia hospitals and clinics. It covers a wide variety of personnel, with or without professional qualifications, who perform a multiplicity of services, many of which have no bearing on medical social work.

The complexities of social work are such that considerable training is required. Shortages of trained medical social workers and low salaries may be factors in securing staff. The health and social agencies which employ social workers should look forward to securing staff with specialized training.

Standards for medical social workers in the general hospitals are somewhat higher than in tuberculosis institutions. This is of very little advantage to tuberculosis patients, however, because relatively few of them are treated in general hospitals.

Few Tuberculosis Patients Served by Social Agencies

In organization, social agencies in Philadelphia are similar to those in other communities where social welfare is in an advanced stage of development. Although there are some major differences between and among the public and private agencies, they appear to be able to meet, with reasonable adequacy, most of the problems which come to their attention. Public assistance grants are low but are higher than in some comparable communities and the agency policies are fairly flexible. Private agency supplementation is occasionally done on the basis of a joint agreement. Provisions are made by all the different resources for most of the medical-social needs of the patient on agency case loads—except, in most instances, payment for medical care which should not be the responsibility of social agencies. Within their limitations, largely budgetary, they are offering a variety of services.

Nevertheless, very few tuberculosis patients or families are receiving service from any of the social agencies. Although the agencies' executives expressed their willingness to have their resources utilized more fully for tuberculosis patients, the small number of such persons receiving service from any of the major social agencies raises important questions. There were some differences of opinion about the readiness with which referrals were accepted by either the private or public agencies. The fact that even the Department of Public Assistance has only a small number of such cases (possibly only 2 percent of its total case load) and the private agencies practically none, may indicate either insufficient referrals of tuberculosis patients and their families to the social agencies or other factors, such as eligibility requirements which may restrict the numbers of persons who are eligible for care. The Philadelphia County Board of Assistance would not reject a client only because he has tuberculosis should he qualify under all provisions of the Public Assistance law. On the other hand, with some of the agencies there may be resistance to accept tuberculosis patients because of the length of time for which care is required and for various other reasons. In view of the general assumption that the majority of tuberculosis patients have many social problems, it would be reasonable to suppose that a fairly large number of them would be known to some social agency. This is not the case in Philadelphia, even granting the admitted inaccuracy of the figures which the agencies reported. Lack of referrals can probably be traced in part to the inadequate medical social services in the hospitals and clinics.

Social agencies are in a strategic position to press for more adequate medical social services and medical care in the community. Very little medical social service is available to patients even during the period of active treatment and practically none at the point of diagnosis and after discharge. Although it would seem that some agency should be partially compensating for this deficiency the social agencies are not getting the patients to any great extent.

Inadequate Provision for Hospital Care

The successful treatment of tuberculosis requires that there be sufficient physical hospitalization facilities to meet actual needs, and, furthermore, that these facilities be available to all who need them without reference to their ability to pay for hospital care. In Philadelphia, two factors interfere with this: The extreme shortage of beds for the hospitalization of tuberculosis patients, and the financial requirements at some of the institutions.

The concept that tuberculosis is a public health responsibility has been accepted by the health department which offers free medical care in Philadelphia General Hospital and in the Philadelphia Hospital for Contagious Diseases. In some of the private hospitals, however, preference in admission apparently is given patients who can pay full rates, and in some of these which do accept part-pay patients, pressure is sometimes exerted on patients to get them to pay as much as possible. Much speculation was encountered about the possible effect of differences in the facilities and services available for full-pay patients as against those provided to patients who receive free care.

Insufficient Allowances for Minor Expenses

Patients in tuberculosis hospitals need allowances for their minor personal expenses during the period of institutional care. This is true for many patients—not just the recipients of public assistance. The State sanatoria have some funds from private sources to be used for patients' needs. However, in most of the local sanatoria and hospitals funds for this purpose are lacking. In some instances, the financial needs are temporary but expensive items such as clothing often create problems, and considerable shopping around has to be done by the social workers to find a resource which will provide the funds. Private community resources are able to meet only a part of this problem.

Insufficient Ancillary Services

The lack of ancillary personnel, such as occupational therapists, vocational counselors, school teachers, in the tuberculosis hospitals and the inadequacy or unavailability of such service for tuberculosis patients in most of the other institutions presents a serious need of which the local professional staffs are very much aware. This difficulty seems primarily the result of insufficient funds and personnel. To some extent, however, it indicates a need for better education to counteract the fear of tuberculosis among the people who are available. On the other hand, there are those who are willing to work in tuberculosis settings. With administrative approval, teachers, for example, could extend their much needed services to tuberculosis patients.

Dealing with Resistance to Medical Treatment

Resistance to the diagnosis and treatment is one of the difficult problems with which doctors, nurses, and social workers must deal. Some patients whose resistance is so great that they do not want to enter the hospital or observe reasonable precautions threaten the safety of others. Such persons are sometimes termed "recalcitrant." The health officer may eventually be faced with the difficult decision of using his authority to protect the individual and the community. This question has been a matter of serious concern to the Philadelphia Health Department which has evolved a plan of court commitment of all "incorrigible" patients in one of the tuberculosis hospitals maintained by the Health Department. During 1948, 84 patients were forcibly hospitalized under this plan. Although the services of medical social workers frequently obviate the need for forcible hospitalization by helping to resolve the patient's resistance to treatment, no such services were available to handle these patients.

This whole subject is receiving more and more attention in many parts of the country. All patients are resistant to a greater or lesser degree at some stage of the disease. With some, this behavior appears to be both anti-social and self-destructive. With others, resistance may continue to be very strong although it may be hidden under a seeming acquiescence to recommendations for care. In such instances, the self-destructive forces may be as great although other people are not endangered. As we acquire greater understanding of the causes of such behavior, there will be greater skill on the part of all who deal with patients.

Lack of Psychiatric Services

Many of the hospitals studied had psychiatric services. These were utilized rarely for the tuberculosis patients themselves, and even more rarely for consultation by the doctors, nurses, and social workers caring for the patients. In a disease in which psychological and emotional factors play such an important part, it is essential that psychiatric knowledge be employed in direct service to patients, where necessary and possible, and in a consultant capacity to those caring for the patients so that their skill may be increased.

Recommendations

In all communities, including Philadelphia, there are certain needs fundamental to tuberculosis control, such as adequate housing, adequate numbers of beds for the tuberculous, enough doctors and public health nurses, sufficient social resources, and a well-defined tuberculosis control program. Although all of these interdependent and social needs are based, in part, on other needs, the recommendations in this section are confined primarily to medical social services and community social agencies.

Medical Social Work

Medical social workers should be provided in the local health department to give case-work services to tuberculosis patients, to provide consultation to other professional persons working with the tuberculous, to develop closer working relationships with other community social agencies, and to furnish data on the unknown social needs among the tuberculous so that additional social facilities may be developed.

A medical social consultant should be added to the staff of the Health and Welfare Council. She should assume some responsibility for improving the standards for social service in the settings where social workers are already employed and stimulate their employment in other places where they are needed.

The number of trained medical social workers in the hospitals should be increased to provide more adequate service to the patients, and the inappropriate administrative jobs being handled by many medical social workers should be assigned to the proper persons.

Coordination

There should be greater coordination between medical, social, and rehabilitation facilities. More patients should be referred from medical sources, and the services of the social and rehabilitation agencies should be made available to a larger group of tuberculosis patients, including more of those not receiving financial assistance. This involves reconsideration of some agency regulations and policies.

Preadmission, predischarge and post-sanatorium supervision for both the patient and the family are responsibilities of social agencies as well as of medical and medical social service personnel.

Evaluation of individual needs requires close coordination on the part of physicians, medical social workers, nurses, vocational counselors, and occupational therapists.

Special attention should be given to serious or complicated rehabilitation problems especially among patients over 50, minority groups, chronics, patients with special aptitudes but a limited market for their skills, and marginal income persons not now eligible for care from the official agency because of the means test.

Educational and vocational programs should be initiated as soon as the individual patient is medically ready.

The number of qualified workers in vocational rehabilitation and occupational therapy should be increased to provide more adequate services.

Research

Social research in tuberculosis is much needed, not only to explore further the local situation in Philadelphia but also to add to our present scanty knowledge. The several research agencies in the city might be stimulated to conduct or participate in some studies of this type. Medical social workers in the hospitals and clinics are in a position to point up areas for study and to provide material even if they do not at present have the time to do the analyses themselves. One problem particularly suggested for investigation is the "recalcitrant" patients who have experienced forcible hospitalization. Another is the adequacy of financial assistance for tuberculosis patients; and a third is a study to determine the unmet needs of the marginal-income group who are not eligible for public assistance. The area of vocational rehabilitation suggests other problems for study. Such studies might provide standards or criteria for determining who needs vocational rehabilitation, what persons will benefit by rehabilitation services and when a person is to be considered rehabilitated.

Special Problems

There should be a review of the legal or administrative restrictions for services to tuberculosis patients, specifically: those which prevent school teachers from going into tuberculosis institutions or to homes where there is any person with the disease, those which exclude tuberculosis patients from the homebound programs, and from rehabilitation benefits under Workmen's Compensation Laws, and those which handicap the nonresident, the noncitizen, and the marginal-wage group.

Psychiatric services should be further utilized and developed.

There is need for special funds (to be administered by the Social Service Departments) in sanatoria, hospitals, and clinics to meet personal, or emergency, or medical relief needs of all patients.

Housekeeping services for families where one or both of the parents are ill and children need care should be extended far beyond the present limited clientele of a single agency.

Social Services in Medical and Public Health Settings

Medical social services have been developing in the United States since the early years of this century but this development has been extremely uneven. In some communities, and in some hospitals, medical social services are excellent. In many places this is not yet true, and in some communities the services in specialized hospitals have developed even more slowly. High standards of medical social work have been developed in many general hospitals and in some few specialized hospitals, like those for children with tuberculosis. In most tuberculosis hospitals such services either have not been developed at all or have not attained desired standards of service or professionally trained staff.

The reason for the inadequacy of medical social service in tuberculosis hospitals is not clear. Whether it results from the isolation of many sanatoria and the difficulty of recruiting personnel, or some worker's hesitation to deal with tuberculosis patients, or lack of experience with social work on the part of tuberculosis doctors is undetermined. But the inadequacy is particularly important in view of the obvious relationship between social factors and tuberculosis.

Philadelphia has progressed beyond many cities; practically all of its tuberculosis hospitals have some degree of social service, albeit of uneven quality. Even with variations in services, a start has been made. That the needs of the patients have been recognized, by and large, is clear. Further development of these services remains to be accomplished.

Health Department

There are in Philadelphia about 13,000 people known to have tuberculosis. Information available from health department records indicates that more than 5,000 are classified as inactive leaving less than 8,000 active and questionably active cases. Of these about 1,000 are hospitalized. An additional 500 are waiting for hospitalization. Approximately 5,500 are under care of private doctors and in clinics. The 12 city chest clinics gave 29,127 examinations and treatments to 11,863 individuals in 1948.

We know from experience that we may expect a variety of social problems among these people. Many patients will have fears about the illness and the treatment, they will be concerned about family dislocations, the cost of medical care, or the possible loss of social status. Some suffer such anxiety that they resist the diagnosis and the recommended treatment. Among the 500 men and women waiting for hospital beds in Philadelphia there will be some with problems of personal adjustment, family finances, housing, and we realize that some of their difficulties may be intensified because they are under care at home. And, of course, husbands, wives, and children of patients are personally and socially affected.

Social Service in the Health Department

There are no social workers in the health department or the health department clinics so that little specific information regarding social problems of clinic patients could be secured. Some of the clinic patients receive services from community social agencies but the extent of the social need among the tuberculosis patients remains substantially unknown. Whether more patients require social services was not determined nor is it known how many would benefit from medical social services in the clinics themselves. The doctors and public health nurses are, of course, doing all they can to alleviate problems as they see them.

The extent to which social conditions contribute to reluctance to enter hospitals or to follow other medical treatment cannot be ascertained without the social service personnel to serve the patients and study the social needs.

Special mention should be made, however, of the Central Cooperative Clinic which has the services of a medical social worker two-thirds of the time. She is responsible for the full patient load, and sees each patient on admission to the clinic, and as indicated thereafter. Casework service is extended to family members and to contacts. This social worker also offers consultation services to members of the clinic staff, and works closely with other community medical and social facilities.

At the Phipps Institute, clinic therapy conferences are held weekly. Social workers from community social agencies are invited to participate and attempts are made to integrate medical and social planning.

Public Hospitals

Public hospitalization is available in Philadelphia for 918 persons. The State Health Department supplies about 400 beds for Philadelphians in its three sanatoria. There are 518 beds, including 22 for children, in the 2 hospitals maintained by the City Health Department and the State pays for care for some patients at nonofficial, nonsectarian hospitals. Under a system known as State Aid, Pennsylvania pays private hospitals eligible for these funds at the rate of $5.50 per day per patient for persons unable to pay their own hospitalization expenses. The hospitals request the total amount needed (based on an estimate) and receive the funds in a lump sum. These funds may be applied to the care of the tuberculous as well as to other patients. The State Department of Health also provides care for patients transferred to local hospitals, pays full private room rates and fees for special nurses, and provides streptomycin.

Social Services in Public Hospitals

The two hospitals maintained by the city, Philadelphia General and

Philadelphia Hospital for Contagious Diseases, which care for tuberculous as well as other patients, also provide social service for tuberculosis patients. The larger hospital, Philadelphia General with 376 tuberculosis patients, has one social worker for the tuberculosis unit[1] who is responsible for all tuberculosis patients and has administrative and other responsibilities as well. There are approximately 10 admissions and discharges a day. It is obvious that one social worker cannot know, much less meet all the needs of such a large group of patients and it is inevitable that many of the patients' problems must remain unknown and unmet.

In situations such as this, and this is unfortunately a common story in much of the United States, despite the valuable services which are being given, much of the social worker's time must be devoted to emergencies and other nonsocial case-work responsibilities. Experience has shown us that adequate social services can prevent many social emergencies which aggravate the medical condition and at least partially nullify the medical treatment.

In the Philadelphia Hospital for Contagious Diseases there are two social workers who are able to devote relatively little time to the tuberculosis ward and who also have administrative and other responsibilities.[2] The "forcible hospitalization" patients are among those sent to this hospial. This group alone requires considerable social attention. Intensive case-work service is necessary to help these patients, many of whose problems stem from their social situations and from their own protest against these situations.

In the State hospitals there is, by and large, no social service. It was agreed by the advisory committee (page 302) that no detailed study be made of these hospitals, but because of their importance in the over-all measures for tuberculosis control, a few general comments are included. The writer had previously made visits to two State sanatoria. In one, the medical director was keenly aware of the social and emotional implications of tuberculosis. He was especially concerned about the discharge-against-advice rate and interested in developing a program of social service. Efforts are being made to recruit a trained social worker. One part-time untrained worker has been assisting with some problems. In another hospital which performs surgery for patients from the other State institutions, there is no social service.[3]

Although there are more than 900 patients in 5 public hospitals there is the equivalent of about 2 social workers to serve them.

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[1] Another social worker has since been assigned to the tuberculosis department of the Philadelphia General Hospital.

[2] An admission division has recently been established, so that social workers are relieved of certain administrative duties and permitted more time to serve patients and their families.

[3] Since the material for this report was gathered, and as a result of this study, a full-time social worker has been employed by one State hospital and a second social worker is to be assigned to another State hospital on February 1, 1950.

Naval Hospital

Social services are supplied by the American Red Cross and two social workers serve the tuberculosis patients on a part-time basis.

General Hospitals

The general hospitals have relatively few tuberculosis patients and a specific number of beds is, by and large, not set aside for them.

Policies regarding admission and retention of tuberculosis patients are dependent upon a number of factors besides the bed capacity. Most of the nonpublic institutions transfer tuberculosis patients to other tuberculosis facilities as soon as possible. Such transfers are not effected very rapidly, however, because of the long waiting lists for beds in the tuberculosis hospitals.

General admission policies are not especially significant since they are not unique. All of the hospitals seem to have fairly liberal policies, in spite of pressures for hospital service. Most of them try to limit their admissions to residents of Philadelphia, some accept nonresidents if they are able to pay full rates.

Payment for in-patient service (by the tuberculosis patients) is not reported as a particular problem in the general hospitals. It is true that there is a relatively small number of tuberculosis cases in these institutions.

Social Services in General Hospitals

The five private general hospitals and the U. S. Naval Hospital all have social service departments. Each has a director of social service and in some instances, a case supervisor also. In one, there is a social worker assigned full time to tuberculosis; in the others there is part-time service as needed.

In three of the hospitals the social workers assume responsibility for all patients from the point of admission. Sometimes they take up this responsibility in the preadmission stages in the clinics and follow through post discharge. This is an ideal arrangement, rarely encountered. In these hospitals which are more adequately staffed than the public hospitals, the social workers are able to give more time to patients' needs. In some, however, they perform a variety of administrative services: They determine financial medical eligibility or secure appliances or arrange for special diets. This means they have less time to spend on patients' personal problems.

The writer was unable to obtain the exact number of tuberculosis patients in these hospitals, but relatively few tuberculosis patients were referred to the social workers. Referral on the basis of the diagnosis is not routine.

Although social services are available in these hospitals, they are of very little benefit to tuberculosis patients as a group, since there are only a few such patients in these general hospitals.

Specialized Tuberculosis Hospitals

The specialized tuberculosis hospitals (in addition to the State and local health department hospitals already mentioned) are all private institutions with bed capacities ranging from 76 to 188. They provide a total of 474 beds. Three receive funds from the community chest and two also receive some State aid funds. They are supported primarily by private or religious groups. Because there are no tuberculosis facilities in surrounding counties, fees are paid by the counties for their residents who are hospitalized in Philadelphia when these patients are unable to meet this expense. In all of these institutions patients' payments constitute a major part of the hospital's income. All of them report that they have some free beds but the number is small. They also have a sliding scale for patients according to ability to pay, but one gets the impression that preferential consideration is given to patients who are able to meet the full cost of medical care. Most of the rates vary from $35 to $70 per week dependent upon the type of bed (ward or private) and the institution. The maximum rate at one hospital is $30, but the majority of patients at this hospital pay $21 per week.

These institutions, with one exception, provide all forms of medical care. Some patients are transferred to the State sanatoria, but full responsibility for care is assumed pending such a transfer. Because of the long period before admission to the sanatoria, and because some patients resist transfer, many receive their full medical treatment in the private hospitals. Consequently, the hospitals screen their admissions rather carefully, accepting patients who best meet their individual (and usually different) eligibility requirements.

Most of the hospitals have some residence limitations but admit nonresidents under certain conditions.

Social Service in Specialized Tuberculosis Hospitals

All of these tuberculosis hospitals have social service departments, but there is marked variation in the activities performed. In one hospital which has the services of a trained social worker there is considerable emphasis on case-work services. Here the discharge-against-advice rate is very low. In the others, the social service personnel, consisting of persons with a variety of backgrounds, are meeting some social problems, but are principally responsible for certain administrative and nonsocial-work activities. In all these hospitals, the social service departments are responsible for admitting, determining financial status, and recommending rate of payment and fee adjustments.

In some, the social workers are not stationed in the hospital but have other community responsibilities so that they visit the patients at intervals and when other duties permit.

Most of these hospitals are so small that the case loads can be handled by one social worker. In two hospitals, case work is admittedly not the major function of the social service department, so that the personal and social needs of the patients inevitably get less attention because of the pressures of other responsibilities. In a third, coverage and service is apparently reasonably adequate even though the social worker is combining administration and case-work activities.

The training and skill of these workers varied considerably as did the kinds of service they gave and the use they made of community agencies.

The social workers in the tuberculosis hospitals were well aware of community and patient needs. They pointed out the need for more financial assistance not only for public assistance recipients but to other patients. They wanted more psychiatric consultation, extension of social, rehabilitation, and occupational therapy services, an opportunity to conduct social research, and free medical treatment for tuberculosis. They emphasized the critical shortage of hospital beds.

Voluntary Health Agency

The Philadelphia Tuberculosis and Health Association provides many services which are primarily related to tuberculosis but also include social hygiene and cardiac problems. The usual eligibility requirements of residence, race, religion, age, etc., do not apply. The principal function of the agency is to act as a referral service to other community services and as a consultant to other agencies. Financial assistance is given on a selective basis usually to those persons who need this help to carry out a vocational rehabilitation plan. Orientation to the problems of tuberculosis not only is provided to the staff but is extended to include workers from other agencies. Special projects are undertaken to test the applicability of newly proposed activities. Some informal research has been done collaboratively and is planned for the future. The Association attempts to supplement the services provided by any other agencies wherever necessary. By a special arrangement with the Veterans' Administration, the Philadelphia Tuberculosis and Health Association operates a special service for veterans whose disability is not service-connected.

Social Agencies in Philadelphia

Nowhere in the Nation have we sufficiently explored the role of community social agencies in tuberculosis control or their potential contribution to the eradication of the disease. It is generally recognized that when families are in need of public assistance the department of welfare is the principal source of aid. In some communities, private agencies can supplement the work of the public agency in special instances, but the role of these private agencies in tuberculosis control is not as clearly delineated as that of the public agencies. Are there social agencies to which families can turn not necessarily for money, but for help in adjusting to the demands of a disease which has complicated the lives of an entire household? What services can these agencies give? To what extent do these agencies in Philadelphia take part in the tuberculosis control effort?

Some of the medical social workers in the medical settings previously discussed felt that the community agencies accepted referrals well and relieved need with direct case work service. Others felt that the needs of the patients and families were very great but were not being met adequately in the community.

Scope of Social Agency Services to the Tuberculous

That the city is attempting to meet the social needs of the general population in Philadelphia is shown by the scope of the program of its public agencies which provide basic subsistence needs and by the multiplicity of private social agencies which attempt to meet specialized problems and supply a skilled case-work service.

But the private agencies for adults and children are serving only a few tuberculosis patients. This is regrettable since these agencies are equipped to meet social and financial problems. Exact figures are not kept, but estimates of several agencies were: in one agency, approximately 2 or 3 tuberculosis patients out of a total present case load of 225; in another, 15 in the past year out of a total of 700; and, in a third agency, 39 persons out of approximately 1,200. Thus, 3 private agencies serving 2,125 cases (representing an unknown number of persons) are giving services to approximately 56 tuberculosis patients or families. The County Board of Assistance helped at least 600 individuals in whose families there was tuberculosis. There are no data available in any of the agencies to indicate whether these figures were increasing, decreasing, or remaining static.

Since none of the agencies has any restrictions about accepting tuberculous patients (who otherwise meet eligibility requirements), the directors explained that the small number of such cases was due to a limited number of referrals. This implied a serious lack of qualified medical social workers in the places where the patients are diagnosed or treated. The directors all felt that the services of their respective agencies met the needs of most tuberculosis patients. No resistance to accepting such cases was expressed by the social agencies although some of the medical agencies had reported occasional difficulties caused by regulations in the social agencies.

The agencies make an attempt to orient their staff members to tuberculosis problems through staff meetings, supervision, and reading material but there are no medical social consultants. Case workers attend medical staff conferences on individual cases at Phipps Institute. Psychiatrists are on the staff of most of these agencies and their services are available to case workers for consultation but are not available, as a rule, for the treatment of clients. With so few tuberculosis cases, however, this important service can be directed to only a fraction of the tuberculosis population.

All cases are handled on an individual basis. Procedures are adapted to the needs of the specific situation. Case workers receive medical information, occasionally visit patients in hospitals, exchange social summaries with medical social workers in hospitals, and share responsibility in getting contacts examined. As stated, all these services are available to the few tuberculosis people who get to the agencies. As a rule, no special attention has been devoted to tuberculosis nor have special procedures been developed for such patients or families because the small number of cases have not warranted special consideration. Research in tuberculosis has not been done in the agencies themselves. They have assisted on studies of other problems but have made none on tuberculosis.[4]

Official or Public Agencies

In Philadelphia the Department of Public Welfare maintains the charitable, correctional or reformatory institutions and agencies under city control and provides care for adults and children who need certain services. The Department of Public Welfare provides the only public child welfare service in Philadelphia. It maintains a shelter and boarding house for legal residents and transients pending their removal to their place of legal settlement, and places a limited number of children in foster homes. It is not to be confused with the Philadelphia County Board of Assistance which is one of the 67 county administrations of the State Department of Public Assistance. The County Board administers the three special types of public assistance (Old Age Assistance, Aid to Dependent Children, and Pensions for the Blind) and general assistance.

The State Department of Public Assistance which administers all public assistance is the major public social agency, and provides a potential resource for the basic maintenance of tuberculous persons for whom no other resource is available. The number of professionally qualified case workers in this agency is proportionately smaller than in the others. The financial grants given to recipients are regulated by law and agency policy, and are available to all persons in need, regardless of the reasons contributing to their economic dependency. The maximum monthly amounts given are $55 for a single person on General Assistance or Old Age Assistance, $40 for a Blind Pension; for Aid to Dependent Children and General Assistance families, the amount depends upon the size of the family. For a family of four the maximum amount is $131. In individual cases, specific needs may be met in excess of these maximums, to allow for such things as special diets, transportation to clinics, etc. There is no delay in processing applications.

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[4] As a result of the interview for this study, one agency decided to engage in an informal study of its case load and to arrange a conference on tuberculosis.

The basic concept in the administration of all public assistance is the need of the individual, regardless of the reasons contributing to his need. Therefore, public assistance agencies do not have readily available statistics regarding the specific reasons for the financial need of all families in the entire case load, and such data can be secured only by specific research into the causes of financial dependency.

Tuberculosis. It was not possible to obtain the number of persons with tuberculosis, or of families in which there is tuberculosis, who are receiving public assistance. However, in Philadelphia, the County Board of Assistance has available data on all the special diet allowances given to individuals. The figures obtained from a count of the diet allowances given by the Philadelphia County Board of Assistance provide some data on the number of tuberculous patients under its care. The count was made by individual and family unit of the numbers receiving special diets because of tuberculosis and included both patients and contacts, but the number of each is not known. It excluded, of course, patients in hospitals although relatives at home may have been included. These data cannot be considered an accurate or complete count of the tuberculosis patients or their contacts receiving public assistance in Philadelphia, but may be some indication of the size of the case load.

The Philadelphia County Board of Assistance supplied the following information on special diets as of October 1948. The tabulation shows the number of persons receiving public assistance in Philadelphia and the number receiving special diets because they are tuberculosis patients or contacts.

	Cases	Individuals
Total	42, 100	82, 400
Special diets because of tuberculosis	382	600
Old age assistance	55	55
Aid to dependent children	150	350
General assistance	175	195
Blind pension	2	2

Private Agencies

As in the public agencies, services are given to all clients on an individual basis. Policies are liberalized whenever possible and wherever necessary. Supplementary financial assistance can be provided by the private agencies for persons receiving public assistance grants on the basis of an agreement recently worked out jointly. For example: A family requiring special allowances above the public agency maximum can receive additional help in some instances. Within or between the public and private agencies, policies permit the meeting of almost any reasonable need including transportation, housekeeping service, psychiatric consultation, special medical needs, and medical treatment. If these services are not supplied by the private agency, they can be purchased elsewhere or provision is made for increasing the patient's income so that he can obtain them for himself.

Tuberculosis. Some of the agencies have special services for which tuberculous patients among others are eligible. One agency conducts a counseling service for the aged and an information center and referral service to social agencies in the community. Another has a personal aid bureau for inmates of penal institutions and parolees, a small business loan or counseling department and makes special provisions for the refugee and immigrant. Several agencies share the medical facilities of the Community Health Center which provides periodic physical examinations for their clients, and one provides case-work service for three day nurseries. The Homemakers' Service (visiting housekeepers) of one agency and home economists are also valuable potential resources for tuberculosis patients.

Although services of almost all varieties are available only a handful of tuberculosis patients receive them. The reasons for this are not known. Are an insufficient number referred to these agencies? Are the agency admission policies restrictive? Are there other possible explanations?

Special Agencies for Children

Private children's agencies supply the major child welfare services with the exception of those rendered by the Department of Public Welfare and the Philadelphia County Board of Assistance (Aid to Dependent Children).

Policies are regulated both by charter and by supervising boards. Most of the agencies are on rather limited budgets which in turn limit the number of cases they can accept. All the children's agencies provide some medical attention for the children under care including physical examinations, tuberculin tests and X-rays when indicated.

Among the case-work staff in the children's agencies professional qualifications vary. Only one executive reported that all staff members have full social work training. Several agencies have some partially trained workers or some members of the staff who have completed their training. In addition to case workers, the agencies have one or more personnel from other professions, such as: psychiatry, psychology, dietetics, teaching and vocational counseling.

Tuberculosis. One of the serious problems found everywhere in tuberculosis control is how to care for the children of tuberculous parents and for tuberculous children whose homes are unsuitable. There are many cases of hardship known to doctors, nurses, and medical social workers, but inquiry into the case loads of children's agencies in several communities has revealed very few such children under care. This is true in Philadelphia. Again, the explanation for this is not known. Perhaps the need is not always recognized. Many families, unaware of community resources, may make their own arrangements. Sometimes those arrangements are satisfactory. On other occasions, the family, and more often the child, pays a heavy price. Often a child is separated not only from the sick parent but from the other because of new living arrangements or employment of the remaining parent. If community resources are properly utilized it is often possible to prevent the complete breakup of a family during periods of crisis.

The numbers of cases of children with tuberculosis handled by these agencies were somewhat difficult to obtain because no such statistics are maintained. Specific intake policies for tuberculous children have not been defined because the number of referrals has not demanded any such consideration. In general, the agency executive thought they could handle most of these situations. None of the agencies reported any instances in which children were forcibly removed from their homes to break contact with tuberculosis, although such a possibility is implied in the regulations enabling forcible hospitalization when necessary. In no case was medical care ordered by the court when the parent had refused it for the child. Special diet allowances are given if they are medically recommended. The River Crest Preventorium serves primarily for the temporary placement of children who are contacts or who have healed lesions. The bed capacity is 100, but average occupancy is 50.

Few active tuberculosis cases were known to any of the children's agencies. One, however, reported two deaths from tuberculosis in its annual report for the preceding year. In almost no instance has there been a request to place a child with arrested tuberculosis in an institution or foster home after he has been discharged from a hospital. There have been few requests for replacement of primary cases to prevent further activation. Two agencies reported a fairly large number of contacts; one had no available figures, and the other had placed 28 children out of a total case load of more than 350 during the previous year. It is not surprising, considering the low incidence rate among children, that few tuberculous children require service. It is not known, however, why more service was not rendered to children of parents with tuberculosis. Again, is this due to lack of referrals from the medical agencies or restrictive eligibility requirements among the social agencies? What is happening to the children of the tuberculous?

Social Services in Specialized Agencies

The American Red Cross, Travelers' Aid, and Veterans' Administration are all national organizations with local chapters or offices in many parts of the Nation. All supply social service but have, of course, different kinds of administrative policies, functions, and procedures.

American Red Cross. Provides social service at the United States Naval Hospital in Philadelphia. The Southeastern Pennsylvania Chapter serves five counties, including Philadelphia. Its major responsibilities are described as multiple health and welfare services. Red Cross services are primarily related to problems arising from military service and are given to servicemen, veterans and/or dependents of each. Many receive some type of service for problems relating to government benefits and for family or personal problems. There is close coordination between the Chapter and the hospitals in planning for patients, and in the use of community resources. Financial assistance, based on community budgetary standards, is given in some instances.

During the period of study only five tuberculosis cases could be identified in the group receiving financial assistance. These had not required any special planning and each problem was handled on an individual basis. It is possible that there may have been more tuberculosis cases or problems. Most of the services given by the Red Cross are emergency or temporary. A longer contact or more careful analysis might have revealed additional health problems. The flexibility of policies in the Red Cross is a major asset; the agency apparently can meet most needs through the Chapter itself or through referral to appropriate resources.

Veterans' Administration. Tuberculous veterans are eligible for benefits under the terms of Federal legislation. Public Law 458 (July 16, 1947) stipulates that disability pensions can continue for 2 years after tuberculosis has been arrested and that reduced pensions can be subsequently continued for varying periods of time. The maximum current disability pensions are $138 a month for veterans with service-connected disability and $60 for permanently and totally disabled veterans with nonservice-connected disability.[5] Additional amounts are given for dependents if the veteran has a 60 percent disability. If necessary, the pensions may be supplemented by public and private social agencies.

Tuberculosis patients who are veterans and eligible for these benefits thus have, by law, an advantage over other tuberculosis patients because much of the basic financial insecurity is relieved even though other pressing social problems are known to remain.[6]

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[5] Public Law 339 (81st Cong., October 1949) has further extended the benefits for tuberculosis.

There were 988 veterans with tuberculosis in the Philadelphia area of whom 554 had tuberculosis classified as nonservice-connected. The social workers in the Veterans' Administration hospitals and regional offices are responsible for social follow-up of patients. The over-all procedures are established by the central office of the Veterans' Administration. Social service begins in the regional out-patient clinic, is continued by the hospital social workers through the period of hospitalization, and in the case of veterans with service-connected disabilities is further continued by the regional office after discharge. During the patient's hospitalization the regional office continues to work with the family when the veteran's problem is related to the home situation, coordinating its work with that of the social service department in the hospital and community social agencies to which the families are referred. The regional office in Philadelphia serves the Philadelphia veteran patients hospitalized in any Veterans' Administration hospital, although most of these patients are sent to Veterans' Administration hospitals in the Western part of Pennsylvania. The veterans with nonservice-connected illness who require social services receive them from local social service agencies, and some special services from the local tuberculosis association. The social service staff in the regional office has been developing its social service in relation to tuberculous veterans and believes that services to these patients could be greatly improved. One of their difficulties has been staff shortages; local veteran clinics for outpatient service and hospital facilities have become available only recently and more experience is needed so that policies and procedures can be developed.

Travelers' Aid Society. The Travelers' Aid assists "moving persons," the transients, travelers, newcomers, and nonresidents. Other community resources for this group are limited. Their services are usually on an emergency basis and medical problems do not come to their attention unless the "moving person" is obviously or seriously ill. For this reason, it would be very difficult for the agency to know the number of tuberculosis patients they may have served. The director could recall only two and in both of these instances the particular problem was an attempt to obtain a hospital bed through the local department of health. Her comments were, accordingly, in relation to the general problems of persons coming to the agency's attention rather than specifically concerning tuberculosis. She agreed with some of the other executives that legal residence requirements and the lack of adequate housing were major difficulties in Philadelphia.

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[6] Tollen, Wm. B. Irregular Discharge: The problem of hospitalization of the tuberculous, VA Pamphlet 10-27. Pub. Health Rep. 63: 1441 (1948).

Rehabilitation Services

Rehabilitation services for tuberculosis patients in Philadelphia are somewhat difficult to evaluate because of lack of standards. The number of patients requiring rehabilitation was unknown, and there were variations in numbers of referrals, adequacy and availability of services among different agencies. Marked differences are found in different types of medical settings and in the extent to which the available resources have been used. The general hospitals have more types of service than the sanatoria. Most of the former have occupational therapists or recreational workers, librarians and teachers but no rehabilitation counselors. However, these persons give little or no care to tuberculosis patients.

The private tuberculosis hospitals have less variety of service than the general hospitals but counselors from the Philadelphia Office of the State Bureau of Rehabilitation are available for consultation service. The private sanatoria are fairly well staffed; they are small enough for services to be handled adequately by one full-time person. In one public hospital the occupational therapist spends half time on tuberculosis patients.[7] There was formerly a rehabilitation center which is to be reestablished some time in the near future. The State sanatoria with their several hundred patients need much more service than they have. One has some ancillary personnel at the present time, a full-time occupational therapist employed by the State Department of Health (salary is supplemented by funds from local tuberculosis associations), and a rehabilitation counselor provided by the State tuberculosis society. The other two sanatoria have limited counseling service from the official rehabilitation agency.

The health department clinics, Central Cooperative Clinic, and the private clinics have none of these services.

Possible reasons for the variations in the availability of ancillary personnel in the general hospitals are (1) in some there were an insufficient number of tuberculosis patients and these were hospitalized temporarily for surgery or pending early transfer elsewhere; (2) some rehabilitation agencies did not want their personnel to face the dangers of exposure to an infectious disease; (3) the physicians were not wholly in sympathy with the idea; or (4) there were insufficient funds and staff to give as much service as was needed generally and the tuberculosis patients suffered like the others. The last two points could also explain the lack or inadequacy of these services in the tuberculosis sanatoria. The methods for remedying this situation require careful consideration since they involve serious limitations of funds and/or lack of interest on the part of responsible persons.[8]

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[7] As of January 1, 1950, a complete occupational therapy department is to be developed in the Philadelphia General Hospital. This project was under consideration for 2 years. The tuberculosis department of the hospital will have a full-time occupational therapist provided by funds from the Philadelphia Tuberculosis and Health Association.

The Bureau of Rehabilitation is the principal resource for vocational rehabilitation in the community. The Bureau is not able to render a complete service because of insufficient funds at its disposal. Because of this there are limitations to the Bureau's services in terms of numbers and types of patients, allowances for tuition, and maintenance and kind of training. The use of a means test as an eligibility requirement also restricts the service given.[9]

The other agencies offering rehabilitation services (with the exception of the Veterans' Administration Vocational Rehabilitation and Education Division) find themselves in the reverse position, that of insufficient referrals. For the past several years very few tuberculosis cases have been referred to these agencies. One explanation given by an agency director was that tuberculosis patients are reluctant to accept referrals for occupational therapy and rehabilitation counseling, because of emotional reactions to the disease. In some instances, patients are anxious to go to work immediately and earn money after a long period of dependency; in others there is the tendency to prolong convalescence as long as possible because of the frequently encountered fear of breakdown. There is unquestionably some significance to these points, but there may be other factors operating which warrant consideration. With the exception of one agency which questioned its usefulness for tuberculosis patients because of the danger of exposure to dust (the work provided was largely renovation of discarded articles), all the executives are willing to have these referrals if the patient's disease is arrested or noninfectious. An additional possible explanation, in the writer's opinion, is that the inadequacy of medical social services in the local clinics, hospitals, and sanatoria probably results in insufficient planning and evaluation of the patient's needs during hospitalization and after discharge.

Any attempt to determine the extent to which the rehabilitation needs of tuberculosis patients are being met must be largely hypothetical, as there are no standards on which to base any estimate of the number of tuberculous patients needing vocational rehabilitation. Estimates have varied from 10 to 33⅓ percent of the total case load. It has been reported that there are about 6,500 known active and questionably active tuberculosis cases at home in Philadelphia. Figures are not available, but it is estimated that approximately 250 are receiving rehabilitation service.

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[8] A 10-year study of the rehabilitation of the tuberculous was completed in July 1949. Through demonstration and research the need for counselors and other services was brought out.

[9] Since the material for this study was gathered the situation has changed. The Bureau is now able to handle all the referrals it receives. Funds are adequate for tuition, maintenance, and other services. The means test has been liberalized so that more people are eligible for services.

Method of Study

The following resources were studied:[10]

MEDICAL AND PUBLIC HEALTH AGENCIES

Official Health Agencies

Health Department. Tuberculosis Control Division; Clinics; Philadelphia General Hospital; Philadelphia Hospital for Contagious Diseases; Central Cooperative Clinic of Temple University.

U. S. Naval Hospital.

State Sanatoria.

Nonofficial Health Agencies

Hospital of the University of Pennsylvania; Pennsylvania Hospital; Graduate Hospital; Children's Hospital of Philadelphia; Hahnemann Hospital; All Saints Hospital; Eagleville Sanatorium; Rush Hospital for Consumption; Barton Memorial Division of the Jefferson Hospital.

Voluntary Health Agency

Philadelphia Tuberculosis and Health Association.

SOCIAL AGENCIES

Official

Department of Public Welfare; Philadelphia County Board of Assistance; Veterans' Administration.

Nonofficial

The Philadelphia Protestant Episcopal City Mission; Family Society of Philadelphia; Jewish Family Service of Philadelphia; Association for Jewish Children of Philadelphia; Bureau for Colored Children; The Catholic Children's Bureau; Children's Aid Society of Pennsylvania; The House of the Holy Child (now Children's Services, Inc.); Society for the Prevention of Cruelty to Children; American Red Cross; Travelers' Aid Society of Philadelphia.

REHABILITATION AGENCIES

Official

State Board of Vocational Education:
  Bureau of Rehabilitation.
  Homebound Service.
Veterans' Administration Vocational Rehabilitation and Education Division.
School District of Philadelphia, Board of Education Medical Service:
  Division of Vocational Education.
  Division of Pupil Personnel and Counseling.

Nonofficial

Philadelphia School of Occupational Therapy; Curative Workshop; Visiting Nurse Society of Philadelphia Occupational Therapy Department; Rehabilitation Committee of the Health and Welfare Council, Information and Advisory Service for the Handicapped; Shut-In Society, Pennsylvania Branch; Philadelphia Society for Crippled Children and Adults, Inc.; Good-Will Industries.

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[10] Several other organizations were not actually visited and thoroughly studied, but information was secured by letter or other means. They contributed to some extent to the total picture.

Most of the foregoing information was gathered from interviews with staff members of the agencies listed above. Conferences were held with State and local tuberculosis control officers and others who are in a position to give information or make recommendations.

Background material was gained from published and unpublished reports, articles, theses, and various other studies. Schedules were used for recording the information gained in interviews (pp. 303–305). Summaries of this material were submitted for approval to the agency executives. Some parts of the report were also submitted for comment to the appropriate organizations: National Tuberculosis Association, Veterans' Administration, and the Office of Vocational Rehabilitation. Tentative findings and recommendations were discussed with members of an advisory committee composed of professional persons representing the major social work fields of the study. These committee members were:

Chairman: Frances N. Harrison, Executive Director, Federation of Jewish Charities, 1511 Walnut Street, Philadelphia.

Sophie Averbach, Medical Social Worker, Central Cooperative Clinic, Temple University Medical School, Philadelphia.

Merrill L. Dawson, Rehabilitation Consultant, Pennsylvania Tuberculosis Society, 311 South Juniper Street, Philadelphia.

Muriel Gayford, Lecturer in Medical Social Work, Department of Social Economy and Social Research, Bryn Mawr College, Bryn Mawr, Pa.

Wayne Hopkins, Executive Secretary, Armstrong Association, 1434 Lombard Avenue, Philadelphia.

Holland Hudson, Director, Rehabilitation Service, National Tuberculosis Association, 1790 Broadway, New York 19, N. Y.

Adaline Johnesse, Psychiatric Social Work Consultant, Office of Vocational Rehabilitation, Federal Security Agency, Washington 25, D. C.

C. Marion Kohn, Consultant on the Visually Handicapped, Philadelphia County Board of Assistance, 112 North Broad Street, Philadelphia.

Elizabeth Kurtz, Executive Secretary, Cerebral Palsy Society, 8 South Fifteenth Street, Philadelphia.

Gertrude K. Langton, Executive Secretary, Association of Tuberculosis Clinics, Philadelphia Tuberculosis and Health Association, 311 South Juniper Street, Philadelphia.

Margaret Nix, Executive Secretary, Family Division, Health and Welfare Council, Room 1000, 311 South Juniper Street, Philadelphia.

Ralph Ormsby, Executive Director, Family Society of Philadelphia, 311 South Juniper Street, Philadelphia.

Mary L. Poole, Director, Department of Social Service, University of Pennsylvania Hospitals, Philadelphia.

Ivan Shrader, Rehabilitation Counselor, Board of Vocational Education, Bureau of Rehabilitation, 1207 Chestnut Street, Philadelphia.

* * *

The writer appreciates the cooperation of the persons who participated in this study. Information was given freely and with expressions of keen interest. There was frank admission of shortcomings and limitations in services. The most critical and searching self-evaluation was done by the agency executives and staff members who are apparently providing the more adequate services. Any shortcomings in the local social resources are not due to lack of vision among the administrators.

SCHEDULE FOR MEDICAL SOCIAL SERVICE [11]

Institution

1. Name.
2. Location.
3. Type: Whether separate clinic, hospital only, hospital with out-patient department; private, public, general, or special for tuberculosis.
4. Size: Bed capacity or daily average clinic visits for general cases and for tuberculosis.
5. Medical services: Clinic, diagnostic only, ambulant pneumothorax; hospital, bed-rest, pneumothorax, other surgery.
6. Admission requirements or limitations: Residence, racial, age, stage of disease, other.
7. Nonmedical staff (on TB service): Number of each and whether full time or part time: Medical and/or psychiatric social workers, occupational therapists, rehabilitation workers, librarians, teachers, others.
8. Administration: Board or department responsible. Name of director.

Social Service Department

1. Organization: Under whose jurisdiction does it operate? Job titles of workers and number of each. Number of separate workers for tuberculosis service.
2. Personnel: Name of director. Name, professional qualifications and length of employment in medical social work of each of the workers assigned to tuberculosis service. Length of time in this institution and in this assignment. Who appoints staff? Is there a merit system? Standards of employment. Does director consider staff adequate (professional and clerical)? Are personnel standards good? Is physical set-up adequate?
3. Finances: Is department financed through hospital budget, private funds or otherwise? Are salaries, supplies, aid to patients for nonmedical needs included in budget? Is budget adequate?
4. General functions: Discuss each. Admitting, case-work service (basis of selection of cases—100 percent review, referral of individual patients, new admissions routinely, hospital discharges routinely; average monthly tuberculosis case load, number patients served last year, is service extended to family and contacts?), consultation, recreation, supervision (are there students in training from a school of social work?), teaching (of medical students, internes, student nurses, student dietitians, others), and miscellaneous (such as follow-up of patients either routinely or on selected basis, determination of eligibility for medical care or other medical needs, clinic management).
5. Major problems encountered: Discharges against advice, disciplinary discharge, financial, family, other.
6. Procedures: Are summarized social service records included in medical charts? What other recording methods are used? Are medical social summaries sent to cooperating agencies? Use of Social Service Exchange. Are monthly and/or annual reports submitted, and to whom? Does social worker attend (1)

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[11] These schedules are condensed versions of those used as guides for the interviews with agency staff members. The originals provided adequate space under each heading for recording the information secured.

social service staff meetings, (2) ward rounds, (3) medical staff conferences, (4) rehabilitation conferences?

7. General: Is psychiatrist available for consultation and/or treatment? Rate according to scale of excellent, good, fair, poor, the following: relationships with medical staff, other staff, health department, local social agencies. Has the worker on the tuberculosis service done any research either in collaboration or independently? Has it been published? Worker's and director's opinion of the efficacy of the service provided? What improvements do they suggest?

SCHEDULE FOR SOCIAL AGENCY

Description of Agency

1. Name of agency: Names and titles of persons interviewed; name and title of director.

2. Type of agency: Family service, child welfare, veterans, public assistance, generalized.

3. Auspices: Private nonsectarian, sectarian; public-State, county, city.

4. Source of support.

5. Staff composition: Number and percent with full professional training—case workers, medical social consultants, physicians, nurses, psychiatrists, dietitians, psychologists, other special and nonadministrative or clerical personnel. List titles or responsibilities for "others."

6. Major services: Does your agency include any of the following provisions in its services—medical relief, psychiatric consultation (to staff, to patients), housekeeping, convalescent care, psychiatric treatment.

7. Policies: Are eligibility requirements for service stipulated by law; by policy? Are tuberculosis patients included in case load? If by special provision, describe. If excluded, indicate reason. Are any of the following factors requirements for service—legal residence, citizenship, race or religion, age, geographical location, finances.

Services to Tuberculosis Patients

1. Number of patients served currently? Total case load? Is this number more or less than usual?

2. What special consideration, if any, is given to tuberculosis patients; e. g., liberalization of intake policies, early appointments for applications, additional grants for relief, special case load for social workers, other.

3. Procedures followed in providing service. Orientation of case work staff to special problems of the tuberculous. Describe method; e. g., institutes, medical social consultation, staff meetings, reading material, visits to tuberculosis institutions. Do social workers visit their clients who are patients in tuberculosis hospitals or sanatoria? Are social summaries exchanged between agency workers and medical social workers in tuberculosis hospitals? What methods are used to obtain medical reports on tuberculosis patients? What responsibility is assumed for having contacts examined? Does this agency provide necessary supplementation of public assistance? If so, on what basis? Is any financial aid provided by this agency for: patients' medical needs, payments for medical care, purchase of appliances, streptomycin, other special medications, allowances for patients in hospitals, clothing for patients in hospitals, transportation. Have any research projects relating to tuberculosis been done in this agency?

General comments on the adequacy of services this agency is able to provide to tuberculous patients.

Comments on unmet needs in the community as seen by this agency representative.

SCHEDULE FOR REHABILITATION AGENCY

Description of Agency

1. Name of agency: Names and titles of persons interviewed.
2. Type: Medical, rehabilitation, educational.
3. Auspices: Public, private.
4. Administration: Board, title and professional training of administrator.
5. Staff composition: Number of each; whether full or part time and professional qualifications—physicians, psychiatrists, teachers, psychologists, nurses, rehabilitation counselors, social workers, librarians, occupational therapists, recreation workers, lay volunteers. Major functions of each staff member. Do patients or ex-patients assist?
6. Funds, physical plant, equipment, clerical assistance. Comment on adequacy of each.

Types of Rehabilitation Services

1. Vocational rehabilitation: Testing, counseling or guidance, training (tuition, supplies, maintenance), placement, follow-up, special medical or psychiatric treatment, appliances or other medical relief.
2. Occupational therapy: Individual diversional, prevocational testing, prevocational training, home-bound service, group recreational, group meetings, patient publications.
3. Teaching or training: Academic, vocational.
4. Library service: Unsupervised distribution of books, bibliotherapy.
5. Are any other services provided for the tuberculous?

Policies Governing Availability of Services

1. Are pulmonary tuberculosis patients accepted? If so, at what stage in patient's disease? Is medical recommendation required, including stipulation of hours of activity patient can safely undertake? Who may refer patients: Physicians, nurses, social agencies, medical social workers, others? Is there an established pattern for referral, e. g., when patient reaches a certain diagnostic stage or activity tolerance level? Are there legal or administrative requirements or limitations regarding residence, age, race, sex, finances? Number of persons given various services during past year?

Procedures

1. Case conferences: Regularity, frequency, who attends, type of cases discussed, is the patient present?
2. Methods of coordination with other agencies: Exchange of written reports, formal and/or informal discussions, recording (separate and/or in medical charts). Describe discharge planning and post-discharge follow-up. Are cases cleared with Social Service Exchange? Who provides case-work service when indicated?
3. Criteria for closing cases.

Agency worker's evaluation of program, need for and current plans for expansion or improvement both in the agency and in the community.

QUESTIONNAIRE FOR HOSPITALS AND CLINICS

(Hospitals and clinics providing care for tuberculous patients which were not visited by the investigator were asked to complete the questionnaire and return it by mail)

1. Number of tuberculosis patients under care as of this date _______________
2. Is this figure average ________, higher ________, lower ________, than usual?
   If either higher or lower, what amount of difference is there? __________
3. What is the financial status of these patients? Private or full-pay_________
   Part-pay ________ Free ________ (Please indicate proportion of each).

4. Who in your hospital (title) is responsible for:
   a. Admitting interview ____________
   b. Financial investigations ____________
   c. Financial adjustments ____________
   d. Diversional therapy or recreation ____________
   e. Occupational therapy ____________
   f. Vocational rehabilitation ____________
   g. Follow-up ____________
5. Please check the social problems most frequently presented by tuberculosis patients at your hospital or clinic and indicate the person who handles them:
   a. Emotional states related to diagnosis or medical care ____________
   ____
   b. Child placement ____________
   c. Housekeeping service ____________
   d. Housing or other environmental problems ____________
   e. Family relationships ____________
   f. Transfer to other medical facilities ____________
   g. Discharge against medical advice ____________
   h. Others (Specify) ____________
6. Are referrals of the above problems to social agencies handled by any one person? Yes ________ No ________.
   If yes, please specify person ____________
   Title ____________
7. Which agencies are most often utilized in these situations ____________
   Please list ____________
   Have any difficulties arisen in getting care for your patients from community resources? Yes ________. No ________.
   Please comment ____________
8. General comments ____________
   ____

(Signature of person filling out form)

____
Name

____
Title

Erratum

The author footnote referring to Louis S. Reed, Ph. D., coauthor of the article "Tuberculosis Facilities and Planning Under the Hospital Survey and Construction Act," published in the February 3 issue, was incorrectly stated. Dr. Reed is Chief, Medical Economics Branch, Division of Medical and Hospital Resources, Bureau of Medical Services.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED FEBRUARY 11, 1950

Most diseases reported for the current week in the United States showed little change when compared with the preceding week and the corresponding week last year. Reported cases of influenza, measles, and whooping cough show larger increases over last week than did certain other diseases. However, the increase in influenza incidence is almost entirely confined to Texas (from 3,114 to 4,796) and Virginia (from 854 to 1,274). For the corresponding week last year Texas reported 2,612 cases and Virginia reported 431 cases. For the current week, Oklahoma reported a total of 230 cases as compared with 117 last week. The median for Oklahoma is 157 reported cases of influenza.

For the United States, 33,417 cases of influenza were reported for the first 6 weeks of 1950 as compared with 27,416 cases reported for the corresponding period of 1949. The 5-year (1945–49) cumulative median is 27,416. For the first 6 weeks of 1950, Texas reported a total of 18,500 cases of influenza as compared with 14,746 for the corresponding period last year, and Virginia reported a total of 4,761 cases for 1950 as compared with 2,619 for the same period last year.

Reported cases of measles while higher for the current week (6,564) as compared with the previous week (6,230) are below the corresponding week (20,322) of last year and the median (11,260). Reported cases of whooping cough increased from 2,570 to 2,881.

The text table below gives the number of cases of influenza reported by geographic division for each of the first 6 weeks in the current calendar year.

	Jan. 7	*Jan. 14*	*Jan. 21*	*Jan. 28*	*Feb. 4*	*Feb. 11*
United States	4, 077	4, 325	4, 563	6, 512	5, 973	7, 967
New England	1	1	1	------	------	8
Middle Atlantic	4	5	1	3	7	2
East North Central	35	22	48	21	244	98
West North Central	19	43	58	7	45	32
South Atlantic	808	784	959	2, 632	1, 292	1, 731
East South Central	238	262	153	433	700	514
West South Central	2, 653	2, 954	2, 948	3, 144	3, 382	5, 238
Mountain	293	231	379	221	241	312
Pacific	26	23	16	51	62	32

Telegraphic case reports from State health officers for week ended February 11, 1950

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	----	----	----	55	----	11	----	----	15	----	----	1	16	----
New Hampshire	----	----	1	4	----	2	----	----	5	----	----	----	----	----
Vermont	----	----	----	1	----	----	----	----	4	----	----	----	44	----
Massachusetts	5	----	----	110	1	----	----	----	129	----	----	2	152	----
Rhode Island	----	----	----	1	----	6	----	----	10	----	----	----	25	----
Connecticut	----	----	7	67	2	60	1	----	25	----	----	----	108	----
MIDDLE ATLANTIC														
New York	5	3	[2] 2	545	5	262	4	----	[3] 163	----	----	2	207	18
New Jersey	1	2	----	371	----	67	2	----	23	----	----	10	176	----
Pennsylvania	2	----	----	186	9	66	2	----	121	----	1	3	303	2
EAST NORTH CENTRAL														
Ohio	10	----	1	201	10	34	2	----	201	----	----	1	164	7
Indiana	5	----	----	47	----	12	----	----	50	----	----	2	24	12
Illinois	3	2	50	142	1	82	4	----	78	----	2	1	97	1
Michigan	6	1	----	1,633	1	40	1	----	181	----	1	1	246	2
Wisconsin	1	----	47	190	1	14	----	----	82	----	----	1	196	----
WEST NORTH CENTRAL														
Minnesota	----	----	----	70	----	6	----	----	27	----	----	----	27	----
Iowa	----	----	1	732	1	1	8	----	11	----	----	----	2	6
Missouri	2	----	1	18	4	43	1	----	26	----	3	1	17	----
North Dakota	1	----	2	4	----	20	----	----	1	----	----	----	----	----
South Dakota	1	----	----	22	1	----	----	----	15	----	----	----	1	----
Nebraska	----	----	9	137	----	1	----	----	7	----	----	----	3	----
Kansas	1	----	19	5	----	15	1	----	24	1	----	3	10	1
SOUTH ATLANTIC														
Delaware	----	----	----	33	----	----	----	----	4	----	----	----	12	----
Maryland	----	1	3	45	----	30	1	----	28	----	----	----	79	----
District of Columbia	----	----	----	83	1	23	----	----	3	----	----	----	4	----
Virginia	4	----	1,274	35	8	103	----	----	35	----	----	----	18	3
West Virginia	3	----	78	125	1	5	----	----	9	----	----	----	36	6
North Carolina	9	----	----	125	3	----	2	----	29	----	2	1	63	----
South Carolina	4	----	64	112	2	14	----	----	4	----	----	2	7	7
Georgia	3	1	312	31	----	29	4	----	18	----	2	----	3	10
Florida	----	----	----	36	----	14	7	----	6	----	1	----	6	----
EAST SOUTH CENTRAL														
Kentucky	12	----	7	32	1	27	4	----	60	----	1	1	61	27
Tennessee	7	----	178	96	7	----	----	----	41	----	----	2	61	5
Alabama	2	----	309	67	1	80	4	----	17	----	1	2	11	8
Mississippi	16	----	20	46	1	48	----	----	10	----	2	----	1	10
WEST SOUTH CENTRAL														
Arkansas	3	----	212	14	1	59	3	----	8	----	2	----	65	----
Louisiana	8	----	----	34	3	63	6	----	6	----	2	----	11	11
Oklahoma	4	----	230	13	4	68	1	----	17	----	2	1	22	15
Texas	23	----	4,796	161	17	798	30	----	57	1	----	4	220	32
MOUNTAIN														
Montana	2	1	25	26	----	----	----	----	12	----	1	----	4	----
Idaho	1	----	26	6	----	12	6	----	8	----	----	----	----	----
Wyoming	----	----	----	14	----	8	----	----	3	----	----	----	1	----
Colorado	1	----	45	206	1	68	1	----	12	----	----	----	11	8
New Mexico	----	----	----	16	----	9	2	----	11	----	----	1	47	----
Arizona	2	1	209	110	----	25	3	----	36	----	----	1	78	1
Utah	----	----	7	208	----	11	1	----	3	----	----	----	32	----
Nevada	----	----	----	1	----	----	2	----	2	----	----	----	----	----
PACIFIC														
Washington	----	----	----	147	----	3	2	----	79	----	----	----	71	----
Oregon	3	----	7	14	2	33	2	----	17	1	----	----	29	----
California	4	5	25	187	5	63	13	----	138	----	----	8	110	2
Total	154	17	7,967	6,564	94	2,335	120	----	1,871	3	23	51	2,881	184
Median, 1945-49	299	8	4,905	11,260	106	----	48	----	2,748	4	18	41	1,921	----
Year to date 6 weeks	1,053	67	33,417	29,693	529	13,678	704	6	9,971	[4] 9	146	[4] 268	14,350	845
Median, 1945-49	1,878	44	27,416	39,542	520	----	280	2	15,892	23	168	248	13,648	----
Seasonal low week ends	(27th) July 9	----	(30th) July 30	(35th) Sept. 3	(37th) Sept. 17	----	(11th) Mar. 19	----	(32d) Aug. 13	(35th) Sept. 3	----	(11th) Mar. 19	(39th) Oct. 1	
Since seasonal low week	5,324	----	63,947	48,823	1,442	----	42,186	----	26,410	[4] 16	----	[4] 3,641	35,886	----
Median, 1944-45 to 1948-49	9,444	----	63,686	65,666	1,488	----	19,255	----	41,725	77	----	3,782	36,913	----

[1] Including cases reported as salmonella. Cumulative and median figures changed to include salmonella.
[2] New York City only.
[3] Including cases reported as streptococcal sore throat.
[4] Deductions: Smallpox, New Mexico, 1 case for week ended Jan. 21; typhoid fever, Georgia, 1 case week ended Feb. 4.

Alaska: No cases reported.
Hawaii: Influenza, 39 cases.

TERRITORIES AND POSSESSIONS

Virgin Islands

Notifiable diseases—October–December 1949.—During the months of October, November, and December 1949, cases of certain notifiable diseases were reported in the Virgin Islands as follows:

Disease	October	November	December
Ascariasis	1	1	1
Cancer	------	------	1
Chickenpox	1	------	------
Hookworm disease	1	1	------
Filariasis	1	------	1
Gonorrhea	14	15	6
Meningitis, meningococcal	------	------	1
Schistosomiasis	1	------	1
Strongyloides	------	------	3
Syphilis	28	8	27
Trichuriasis	19	18	5
Tuberculosis, pulmonary	1	1	1
Whooping cough	------	3	12

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended January 21, 1950.—During the week ended January 21, 1950, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	------	------	31	------	330	406	39	50	62	129	1,047
Diphtheria	------	------	4	------	8	4	------	------	1	------	17
Dysentery, bacillary	------	------	------	------	------	2	------	------	------	3	5
German measles	------	------	3	------	7	105	------	26	209	42	392
Influenza	------	------	33	------	------	2	4	------	------	------	39
Measles	------	------	55	6	371	406	32	98	75	156	1,199
Meningitis, meningococcal	------	------	1	------	------	1	2	------	------	1	5
Mumps	------	------	75	------	170	613	8	39	55	258	1,218
Poliomyelitis	------	------	------	------	1	------	------	------	------	1	2
Scarlet fever	5	------	6	3	76	50	6	8	87	8	249
Tuberculosis (all forms)	7	------	2	10	88	36	16	11	21	26	217
Typhoid and paratyphoid fever	------	------	------	------	10	1	------	------	------	2	13
Undulant fever	------	------	------	------	------	1	------	------	------	------	1
Venereal diseases:											
Gonorrhea	5	------	3	10	(1)	79	25	19	28	76	[1] 245
Syphilis	2	------	7	3	(1)	41	2	6	4	9	[1] 74
Whooping cough	3	------	14	------	77	61	3	2	3	14	177

[1] Report not received from the Province of Quebec.

CHILE

Santiago—Poliomyelitis.—During the recent outbreak of poliomyelitis in Santiago, Chile, 85 cases, 14 deaths, were reported in Santiago Province for the month of December 1949. For the period January 1–14, 1950, 43 cases, with 6 deaths, were reported in Santiago City, and information dated February 7, 1950, stated that 32 cases with 9 deaths occurred in that city during the period January 15–28, 1950.

FINLAND

Notifiable diseases—November 1949.—During the month of November 1949, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	9	Paratyphoid fever	123
Diphtheria	89	Poliomyelitis	19
Dysentery	111	Scarlet fever	544
Gonorrhea	649	Syphilis	63
Malaria	1	Typhoid fever	31

MADAGASCAR

Notifiable diseases—December 1949.—Notifiable diseases were reported in Madagascar and Comoro Islands during December 1949 as follows:

Disease	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Bilharziasis			36	
Cerebrospinal meningitis			7	5
Diphtheria			7	4
Dysentery:				
Amebic	9		347	3
Bacillary			170	35
Erysipelas			12	1
Influenza	39		1,753	26
Leprosy			28	
Malaria	235	3	30,350	178
Measles			182	
Mumps			65	
Plague			5	5
Pneumonia, broncho	3	1	281	54
Pneumonia, pneumococcic	1		270	32
Puerperal infection			5	1
Relapsing fever	1			
Tuberculosis, pulmonary	7		82	12
Typhoid fever			14	3
Whooping cough			329	10

NEW ZEALAND

Notifiable diseases—5 weeks ended December 31, 1949.—Certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	14	1	Influenza	3	--------
Diphtheria	10	1	Poliomyelitis	16	--------
Dysentery:			Puerperal fever	5	--------
Amebic	7	--------	Scarlet fever	99	--------
Bacillary	6	--------	Tetanus	1	--------
Erysipelas	12	--------	Tuberculosis (all forms)	192	52
Food poisoning	6	--------	Typhoid fever	15	1
Hookworm disease	1	--------			

NORWAY

Notifiable diseases—November 1949.—During the month of November 1949, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	7	Mumps	153
Diphtheria	33	Paratyphoid fever	2
Encephalitis, epidemic	4	Pneumonia (all forms)	3,386
Erysipelas	387	Poliomyelitis	12
Gastroenteritis	2,307	Rheumatic fever	111
Gonorrhea	233	Scabies	1,887
Hepatitis, epidemic	110	Scarlet fever	388
Impetigo contagiosa	2,509	Syphilis	68
Influenza	3,189	Tuberculosis (all forms)	321
Laryngitis	13,150	Typhoid fever	4
Malaria	38	Whooping cough	4,650
Measles	1,375		

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Plague

China—Chahar Province.—Information as to the occurrence of plague in Chahar Province, China, during the year 1949, states that the outbreak started in July and ended in November. A total of 69 cases with 66 deaths was reported in 10 villages. The disease appeared first in bubonic form, but later became pneumonic. No new cases were reported after November 15.

India—Cawnpore.—During the week ended January 28, 1950, two cases of plague (one fatal), were reported in Cawnpore, India.

Pakistan—Karachi.—During the week ended January 21, 1950, one fatal case of plague was reported in Karachi, Pakistan.

Siam (Thailand).—During the week ended January 21, 1950, five cases of plague, with two deaths, were reported in Siam.

Smallpox

Arabia—Jedda and Mecca.—During the week ended January 28, 1950, 16 cases of smallpox with 4 deaths were reported in Jedda, Arabia, and 11 cases 5 deaths in Mecca.

Burma.—For the week ended January 28, 1950, 262 cases of smallpox with 65 deaths were reported in Burma, including 151 cases 32 deaths in Bassein, and 71 cases 19 deaths in Rangoon. During the preceding week (week ended January 21, 1950), 134 cases with 43 deaths were reported in Bassein and 72 cases with 21 deaths in Rangoon.

China—Sung Shan.—During the period December 21–31, 1949, 34 cases of smallpox with 4 deaths were reported in Sung Shan, China.

India.—During the week ended January 28, 1950, smallpox was reported in cities in India as follows: Calcutta 208 cases, 94 deaths; New Dehli 46 cases, 27 deaths; Cawnpore 32 cases, 14 deaths; Mangalore 24 cases, 2 deaths.

Sierra Leone.—During the week ended December 3, 1950, 25 cases of smallpox were reported in Sierra Leone.

Union of South Africa.—During the month of September 1949, 142 cases of smallpox with 11 deaths were reported in Union of South Africa, of which 113 cases 4 deaths occurred in Transvaal; for the month of October 204 cases, 10 deaths were reported in the Union, including 196 cases, 10 deaths in Transvaal.

Typhus Fever

Spain—Madrid.—During the week ended December 31, 1949, 6 cases of typhus fever were reported in the Consular District of Madrid, Spain.

DEATHS DURING WEEK ENDED FEB. 11, 1950

	Week ended Feb. 11, 1950	Corresponding week, 1949
Data for 93 large cities of the United States:		
Total deaths	9,754	10,023
Median for 3 prior years	10,026	
Total deaths, first 6 weeks of year	57,976	59,864
Deaths under 1 year of age	626	672
Median for 3 prior years	677	
Deaths under 1 year of age, first 6 weeks of year	3,777	4,148
Data from industrial insurance companies:		
Policies in force	69,861,835	70,621,674
Number of death claims	13,123	13,755
Death claims per 1,000 policies in force, annual rate	9.8	10.2
Death claims per 1,000 policies, first 6 weeks of year, annual rate	10.1	9.8

Examination for Dental Officers

Examinations for dental officers in the Regular Commissioned Corps of the Public Health Service will be held April 17–19 in various cities throughout the country. Completed applications must be in the Washington office by March 20.

Appointments are permanent and provide opportunities for career service in clinical, research, and public health dentistry. Benefits include periodic pay raises and promotions; liberal retirement provision; medical care; annual and sick leave.

Appointments will be made in the grades of assistant and senior assistant dental surgeon, equivalent to Army ranks of 1st lieutenant and captain, respectively. Entrance pay is $5,686 for assistant and $6,546 for senior assistant (with dependents), including the $1,200 additional pay received by dental officers and rental and subsistence allowance. Applicants must be citizens and graduates of an approved school of dentistry.

The written professional examination will include oral surgery, oral medicine, oral pathology and bacteriology, anatomy, pathology and bacteriology (general), physiology, pharmacology, operative dentistry, prosthetic dentistry, dental materials, periodontia, roentgenology, public health, and pedodontia.

For application forms and additional information write to: Surgeon General, Public Health Service, Federal Security Agency, Washington 25, D. C. Attention: Division of Commissioned Officers.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, Public Health Service, Washington 25, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington 25, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

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FEDERAL SECURITY AGENCY

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FEDERAL SECURITY AGENCY
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A Method to Determine Levels Of Immunization, Medical, and Nursing Services In Prenatal and Infant Care

By ROSCOE P. KANDLE, M. D., and HENRY GOETZ, M. S.*

Accurate data on critical indices of public health accomplishment and activity, such as the level of immunization and medical and public health nursing services to expectant mothers and infants, are of immediate and extensive use to the conscientious health officer. Since data are not generally available on these services—particularly those provided by private practitioners—this study presents an apparently practical and reliable method for obtaining this information.

The method involves the interrogation of mothers of children 1 year old. Thus, the sample is the total of a specific group of children (age 12 and 13 months) and their mothers rather than a random sample of some other group, say all infants.

This age group of children is chosen because: (a) They have all had a 6 months' opportunity to be protected by immunization by usual practice, and public health teaching stresses protection by this time; (b) the first birthday is a transition period from infant to preschool care in public health thinking and an appropriate time for check-up by public health organizations; (c) the mothers can still be expected to recall the details of the pregnancy.

Interrogation is done by (1) mailing a friendly questionnaire with a stamped, addressed return envelope, (2) telephone follow-up, (3) home visit.

Specific Experience

A specific experience is described in connection with a public health survey in Philadelphia, a city of 2 million.

In 1948 there were 41,746 resident births in Philadelphia. It was determined that the births occurring during a 2-month period one year previous to the study would provide a significant sample. February and March resident births were used, numbering 6,248 (illegitimate births and deaths removed) which is 15 percent of the total resident births. The name of the child, the name and address of the mother and the race were obtained by using slips from an existing system whereby the Child Health Division, Department of Public Health, was notified of all births. It was necessary to go back to the death certificates to check these names against the infant deaths—a step considered very important since the names of several hundred deceased babies were removed. For convenience in handling the material all the slips were classified by ward and race. In order to have a statistical check of the method, the February and March births were handled as separate groups.

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*Field Director, American Public Health Association, and Health Program Representative, Public Health Service, respectively.

In designing the questionnaire,[1] it was realized there was much information which would be useful in planning maternal and child health services, but if the questionnaire were to accomplish the desired results of accurately gaging levels of protection, it must be short, to the point, and so worded as to get completely unbiased answers which could be easily indicated by the respondent. The questionnaire was intended to be friendly and to enlist the interest and assistance of the parent in checking the health of her child and improving the services for all children. The questionnaire was addressed personally to each mother, and the first name of the child was used in the text. Reducing the content of the questionnaire to one typewritten page was considered necessary.

The effectiveness of the selection of questions and wording of the questionnaire was tested in a pilot study which was sent to 100 mothers selected at random from the February 1948 birth listings. Thirty questionnaires were returned within a 2-week period. The answers indicated that persons filling in the data experienced no serious difficulty, so realizing that the returns from a pilot study would be smaller than could be expected from the larger study when community interest was aroused through radio and newspaper publicity, and interested groups, it was decided to proceed immediately with sending out the entire study.

The number of favorable comments regarding the study returned on the pilot-study questionnaires suggested that a high degree of cooperativeness might be expected. This was borne out as the study progressed to its conclusion.

Public Preparation

The project was distinctly a community undertaking. It was authorized by the executive committee of the survey and planned with the help of the technical committee. The executive committee of the survey, composed of leading health executives and citizens, supported it and authorized the necessary funds. The planning of the project was a joint activity of the survey technical committee, composed of health and other social statisticians, and the survey staff. Members of the technical committee furnished advice and assistance throughout the project. The constructive criticisms of this committee were distinctly helpful. They were closely identified with each step of planning, execution, and interpretation.

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[1] See appendix A.

The study was conducted with the knowledge and support of the pediatricians practicing in Philadelphia. The study was fully discussed with as many agencies concerned as possible and brought to the attention of the members of the Health Division of the Health and Welfare Council.

A large contribution to the success of the undertaking is credited to the well-organized publicity which was supplied under the direction of the Community Chest Publicity Division. Intensive newspaper and radio publicity was used effectively throughout the study. Human-interest news stories and progress reports were furnished to the foreign-language and small community newspapers as well as to the large metropolitan newspapers. Daily spot announcements timed to reach the housewife were carried on most radio stations. Professional publications carried explanations of the purpose and objectives of the study and urged cooperation.

Comparison between the pilot mailing of 100 questionnaires without publicity and the main mailing suggests that these efforts increased the mailed replies by about 30 percent. This is most important from the point of view of expense and time.

Follow-Up

Sixty-one percent of the 6,248 questionnaires mailed were returned within the first 3 weeks. At this point, a list of all questionnaires not returned was turned over to the Council on Volunteers of the Community Chest in order that an attempt could be made to reach each mother by telephone. Phone listings were found for about 10 percent of those sought. This was obviously a time-consuming task and required patience and skill since telephone listings were not always the same as appeared on the birth record. The mothers were approached on a friendly basis of interest in their children with an inquiry as to whether the questionnaire had been received. They were urged to return it. The most frequent reasons for not having sent it in were procrastination, delay in receiving mail through change of address or third person, and the misunderstanding that there was still reason for returning the sheet even though the child had been protected. The telephoning appeared to bring in about 6 percent of the returns.

After 3 weeks and with 33 percent of the questionnaires not returned, the home visits were begun. They were all made by public health nurses who had duplicate questionnaires of those already mailed to the parent. The public health nurses of the Child Health Division of the Department of Public Health, the Visiting Nurse Society, and other voluntary agencies each took their share. Difficulty with changed addresses was the only serious problem encountered. Obviously the visits did not need to be sterile data-gathering events but often presented excellent opportunities for public health teaching, especially since the questionnaire served to establish good rapport. Particularly important was the chance to learn specifically why children were not protected.

Returns

Of the 6,248 questionnaires mailed, adequate returns were completed for 5,260 or 84 percent. Of the 982 parents who could not be located, 695 were white (13.8 percent of total white questionnaires) and 287 were Negro (24 percent of total Negro questionnaires). Only six parents were uncooperative. The 5,260 completed questionnaires represent 12.6 percent of the total 1948 resident births. The accuracy of the study could be increased if information were obtainable from the 982 questionnaires where the family could not be located at the address on the birth record, and efforts to obtain a new address were unsuccessful. However, in a period of postwar housing shortage and general unrest, the 982 (16 percent) not located is not considered excessively high.

Reliability

There are several considerations which are seen as making the special sampling study statistically accurate:

1. The group selected is truly a representative cross section of the city—all babies were the same age, and no racial, social, or economic group was excluded.
2. The data were collected with care. The device used for the collection of data, and the techniques employed, were not changed during the survey.
3. The large number of completed questionnaires, with no excessive numbers of any one question or part of a question omitted, indicated that the mothers were able to complete it with no apparent serious difficulty.
4. By sorting punched cards by month (March and February) rather than by totals for both months, we found that the questionnaires from the February group were filled in precisely in the same pattern of percent distributions as the March group. This is significant for it seems to indicate that the sample was large enough and that the respondents were truthful and reasonably reliable.
5. A rather subjective item which increased the confidence of the

staff in the data was their consistency. In the coding, punching, and tabulating no bizarre results were found. Some further evidence of the honest interest of the parents in the questionnaires was revealed in the number who spontaneously wrote notes of comment of all sorts. A study of these comments was a useful byproduct.

Since the pattern of service was of more importance to the staff and the potential users than the absolute levels of protection or service, the data are presented omitting those who could not be located. It is recognized that this probably results in a somewhat abnormally high rate of protection and private medical services and a somewhat low rate of public medical and nursing services. It would be possible to redistribute those not found, according to the distribution of the white and Negro pattern or some other method if desired.

Cost

The cost of such a project is difficult to assess. The cash outlay for this study on postage and mailing was about $750. One clerk worked practically full time for 3 months at a cost of about $450. The statistical analyst on the survey devoted an equivalent of about 2 months on this project for which approximately $900 should be prorated. Telephoning was done by volunteers, and the radio time and newspaper space were donated, although the publicity staff of the Community Chest gave considerable time to these phases. Machine tabulation of results was supplied by the Department of Public Health's Division of Vital Statistics and interpretation was a function of the survey staff. The largest cost was the home visit follow-up. It was done by the public health nurses in this instance. About 2,000 visits were made which, if prorated at $1.50 per visit, amounted to $3,000. Considering all "hidden costs" and calculating the nursing visits as noted, the project may have cost about $5,100. Note that this was in a city of 2 million spending $4,300,000 on its public health program.

Machine Tabulation

In preparing the questionnaire, consideration was given to arranging the data in such a manner as to facilitate key punching for mechanical tabulation of results. In the upper right hand corner, the ward in which the parent lived was typed at the time the inside address was filled in. Sex was not considered as a factor in determining the level of immunization and was, therefore, not coded.

Completed questionnaires were examined and answers needing interpretation for the key punch operator were coded, and a serial number affixed for later reference if desired.

Since it could not be determined precisely what data, or combinations of data, would be needed to properly interpret the results of the study, the use of mechanical tabulation immensely increased the usefulness of the answers obtained.

Interpretation

The questionnaire contained six major questions with nine subquestions. The over-all results obtained for the City of Philadelphia are tabulated in table 1.

The results are extremely interesting.

Table 1. *Results of special sampling study*

Question 1: Has this child received vaccination against diphtheria?	*Total*	*Percent*	*Negro*	*Percent*	*White*	*Percent*
Yes	4,066	77.3	536	59.0	3,530	81.1
No	1,139	21.7	358	39.4	781	18.0
Not stated	55	1.0	14	1.6	41	.9
	5,260	100.0	908	100.0	4,352	100.0
By whom?						
Own doctor	3,101	76.3	81	15.1	3,020	85.6
Health center	610	15.0	309	57.6	301	8.5
Hospital	224	5.5	118	22.0	106	3.0
Other	6	.1	--------	-------	6	.2
Not stated	125	3.1	28	5.3	97	2.7
	4,066	100.0	536	100.0	3,530	100.0
Number of doses?						
1	511	12.6	97	18.1	414	11.7
2	773	19.0	165	30.8	608	17.3
3	2,238	55.0	183	34.2	2,055	58.2
4	69	1.7	12	2.2	57	1.6
5	24	.6	6	1.1	18	.5
6	15	.4	4	.7	11	.3
7	1	--------	1	.1	--------	--------
8 or more	3	.1	3	.6	--------	--------
Not stated or unknown	432	10.6	65	12.2	367	10.4
	4,066	100.0	536	100.0	3,530	100.0
Question 2: Has this child received vaccination against smallpox?						
Yes	2,802	53.3	361	39.8	2,441	56.1
No	2,330	44.3	519	57.1	1,811	41.6
Not stated	128	2.4	28	3.1	100	2.3
	5,260	100.0	908	100.0	4,352	100.0
By whom?						
Own doctor	2,185	78.0	58	16.1	2,127	87.1
Health center	399	14.2	197	54.6	202	8.3
Hospital	147	5.3	78	21.6	69	2.8
Not stated	71	2.5	28	7.7	43	1.8
	2,802	100.0	361	100.0	2,441	100.0
Question 3: Who took care of you during this pregnancy?						
Own doctor	3,692	70.2	144	15.9	3,548	81.5
Hospital	1,468	27.9	716	78.8	752	17.3
No one	49	.9	29	3.2	20	.5
Other	13	.3	4	.4	9	.2
Not stated	38	.7	15	1.7	23	.5
	5,260	100.0	908	100.0	4,352	100.0
How many months were you pregnant before you saw your doctor?						
2	2,061	39.3	132	14.5	1,929	44.3
3	1,657	31.5	216	23.8	1,441	33.1
4	727	13.8	209	23.0	518	11.9
5	390	7.4	145	16.0	245	5.6
6	156	3.0	82	9.0	74	1.7
7	95	1.8	46	5.1	49	1.1
8	44	.8	20	2.2	24	.6
9	55	1.0	31	3.4	24	.6
10	2	--------	--------	--------	2	--------
Not stated	73	1.4	27	3.0	46	1.1
	5,260	100.0	908	100.0	4,352	100.0

Table 1. *Results of special sampling study*—Continued

About how many times did you see the doctor?

	Total	*Percent*	*Negro*	*Percent*	*White*	*Percent*
Weekly	124	2.3	48	5.3	76	1.8
Monthly	4,794	91.1	733	80.7	4,061	93.3
Quarterly	6	1	1	1	5	1
Less often	82	1.6	29	3.2	53	1.2
Not seen	30	.6	12	1.3	18	.4
Not stated	224	4.3	85	9.4	139	3.2
	5,260	100.0	908	100.0	4,352	100.0

Question 4: Were you visited by a public health nurse before this child was born?

Yes	510	9.7	196	21.6	314	7.2
No	4,713	89.6	700	77.1	4,013	92.2
Not stated	37	.7	12	1.3	25	.6
	5,260	100.0	908	100.0	4,352	100.0

How many times did the nurse visit you?

1	152	29.8	43	21.9	109	34.7
2	84	16.5	36	18.3	48	15.3
3	73	14.3	24	12.3	49	15.6
4	76	14.9	36	18.4	40	12.7
5	41	8.0	27	13.8	14	4.5
6	30	5.9	12	6.1	18	5.7
7	23	4.5	9	4.6	14	4.5
8 or more	28	5.5	7	3.6	21	6.7
Not stated	3	.6	2	1.0	1	.3
	510	100.0	196	100.0	314	100.0

Question 5: Did a public health nurse visit you in your home after this child was born?

Yes	3,978	75.6	829	91.3	3,149	72.4
No	1,242	23.6	70	7.7	1,172	26.9
Not stated	40	.8	9	1.0	31	.7
	5,260	100.0	908	100.0	4,352	100.0

How old was this child at the first visit?

Within first 2 weeks	639	16.1	233	28.1	406	12.9
Within first month	1,768	44.4	372	44.9	1,396	44.3
Within first 3 months	1,325	33.3	191	23.0	1,134	36.0
Within first 6 months	155	3.9	17	2.1	138	4.4
Within second 6 months	13	3	7	.8	6	.2
Not stated	78	2.0	9	1.1	69	2.2
	3,978	100.0	829	100.0	3,149	100.0

How many visits were there?

1	1,952	49.1	232	28.0	1,720	54.6
2	746	18.8	189	22.8	557	17.7
3	510	12.8	145	17.5	365	11.6
4	282	7.1	80	9.6	202	6.4
5	135	3.4	51	6.2	84	2.7
6	100	2.5	38	4.6	62	2.0
7	29	.7	6	.7	23	.7
8 or more	104	2.6	60	7.2	44	1.4
Not stated	120	3.0	28	3.4	92	2.9
	3,978	100.0	829	100.0	3,149	100.0

Question 6: About how many times has this child received regular medical check-ups?

None	115	2.2	57	6.3	58	1.3
1 to 5	796	15.1	295	32.5	501	11.5
6 to 10	1,047	19.9	211	23.2	836	19.2
11 to 15	2,948	56.1	270	29.7	2,678	61.6
16 to 20	90	1.7	7	.8	83	1.9
22 to 25	43	.8	8	.9	35	8
28 to 52	18	3	6	.7	12	.3
Not stated	203	3.9	54	5.9	149	3.4
	5,260	100.0	908	100.0	4,352	100.0

By whom?

Own doctor	3,852	73.2	160	17.6	3,692	84.8
Hospital	462	8.8	285	31.4	177	4.1
Health center	525	10.0	305	33.6	220	5.1
Own doctor, hospital, health center	196	3.7	67	7.4	129	2.9
Not stated	225	4.3	91	10.0	134	3.1
	5,260	100.0	908	100.0	4,352	100.0

From question 1 of table 1, it can be calculated that the net level of protection against diphtheria—those known to have had two or more doses—is 63 percent among white children and 41 percent among Negro children. Of great importance in planning public health services is the observation that 86 percent of white children received this service from their private physician but only 15 percent of Negro children did. Conversely 58 percent of Negro children were immunized in health centers and only 8.5 percent of white children.

Table 2. *Results of sample study by wards*

Wards	Questionnaires: Total mailed: Total	Questionnaires: Total mailed: White	Questionnaires: Total mailed: Negro	Questionnaires: Not delivered: Total	Questionnaires: Not delivered: White	Questionnaires: Not delivered: Negro	Questionnaires: Returned uncooperative *	Questionnaires: Completed: Total	Questionnaires: Completed: White	Questionnaires: Completed: Negro	Protection against diphtheria: Yes	Protection against diphtheria: No	Protection against diphtheria: Not stated	Protection against smallpox: Yes	Protection against smallpox: No	Protection against smallpox: Not stated
1	86	83	3	7	6	1	----	79	77	2	65	14	----	46	33	----
2	34	23	11	6	4	2	----	28	19	9	23	5	----	20	7	1
3	32	22	10	8	4	4	----	24	18	6	19	5	----	17	7	----
4	13	8	5	3	1	2	----	10	7	3	8	2	----	7	3	----
7	51	32	19	10	7	3	----	41	25	16	29	12	----	23	18	----
8	14	14	----	4	4	0	----	10	10	----	8	2	----	5	5	----
11	15	7	8	4	1	3	----	11	6	5	8	3	----	4	7	----
12	32	19	13	9	1	8	----	23	18	5	17	4	2	14	7	2
13	43	13	30	8	1	7	----	35	12	23	19	16	----	16	19	----
14	50	10	40	7	2	5	----	43	8	35	25	17	1	17	25	1
15	169	139	30	60	50	10	----	109	89	20	84	25	----	62	45	2
16	24	21	3	3	3	----	----	21	18	3	14	7	----	13	8	----
17	33	33	----	7	7	----	----	26	26	----	19	6	1	12	14	----
18	71	71	----	10	10	----	----	61	61	----	41	20	----	18	41	2
19	156	146	10	38	36	2	----	118	110	8	80	38	----	51	64	3
20	150	73	77	39	20	19	----	111	53	58	73	38	----	50	59	2
21	141	137	4	14	12	2	----	127	125	2	103	23	1	53	72	2
22	326	283	43	32	30	2	1	293	252	41	238	45	10	160	120	13
23	180	173	7	24	22	2	----	156	151	5	129	24	3	89	60	7
24	214	84	130	58	19	39	----	156	65	91	101	53	2	74	78	4
25	116	116	----	18	18	----	----	98	98	----	66	32	----	42	54	2
26	195	173	22	24	21	3	----	171	152	19	146	24	1	112	56	3
27	87	77	10	25	22	3	1	61	54	7	51	7	3	39	20	2
28	168	104	64	29	15	14	1	138	88	50	98	39	1	77	58	3
29	105	61	44	25	10	15	----	80	51	29	51	29	----	34	46	----
30	80	14	66	18	1	17	----	62	13	49	39	23	----	28	33	1
31	78	77	1	8	8	----	----	70	69	1	42	28	----	26	42	2
32	227	55	172	61	12	49	----	166	43	123	113	52	1	83	79	4
33	194	192	2	21	20	1	----	173	172	1	137	31	5	79	88	6
34	139	119	20	16	14	2	1	122	104	18	103	19	----	65	51	6
35	445	443	2	36	35	1	1	408	407	1	352	55	1	237	158	13
36	181	114	67	24	11	13	----	157	103	54	98	54	5	70	82	5
37	63	50	13	19	12	7	----	44	38	6	34	10	----	23	19	2
38	284	269	15	46	44	2	----	238	225	13	192	41	5	122	111	5
39	189	180	9	17	17	----	----	172	163	9	151	17	4	120	46	6
40	145	131	14	16	13	3	----	129	118	11	86	43	----	60	65	4
41	191	191	----	15	15	----	----	176	176	----	151	24	1	101	70	5
42	140	140	----	13	13	----	----	127	127	----	112	14	1	84	40	3
43	123	120	3	18	18	----	----	105	102	3	78	26	1	56	46	3
44	118	49	69	32	14	18	1	85	34	51	52	31	2	30	52	3
45	117	116	1	12	12	----	----	105	104	1	77	28	----	48	55	2
46	242	239	3	46	46	----	----	196	193	3	176	18	2	124	70	2
47	110	37	73	22	9	13	----	88	28	60	47	40	1	31	57	----
48	110	102	8	16	15	1	----	94	87	7	70	24	----	59	35	----
49	138	135	3	12	10	2	----	126	125	1	110	15	1	85	40	1
50	157	157	----	9	9	----	----	148	148	----	138	10	----	97	48	3
51	141	115	26	12	9	3	----	129	106	23	102	27	----	53	75	1
52	131	86	45	21	12	9	----	110	74	36	91	19	----	66	42	2
Total	6, 248	5, 053	1, 195	982	695	287	6	5, 260	4, 352	908	4, 066	1, 139	55	2, 802	2, 330	128

*All white

Table 2. *Results of sample study by wards*—Continued

Wards	Care during pregnancy					Visit by public health nurse before child was born			Visit by public health nurse after child was born			From whom child received check-ups				
	Own doctor	Hospital	No one	Other	Not stated	Yes	No	Not stated	Yes	No	Not stated	Own doctor	Hospital	Health center	Own doctor, hospital, or health center	Not stated
1	46	33	----	----	----	20	57	2	73	6	----	57	9	5	2	6
2	11	17	----	----	----	9	19	----	27	----	1	16	4	6	1	1
3	18	5	1	----	----	4	20	----	21	3	----	16	----	6	2	----
4	2	7	1	----	----	5	5	----	10	----	----	3	4	2	----	1
7	22	16	----	1	2	6	34	1	28	13	----	20	7	12	2	----
8	8	2	----	----	----	----	10	----	3	6	1	8	1	1	----	----
11	2	9	----	----	----	5	6	----	11	----	----	1	2	7	----	1
12	10	10	2	1	----	3	18	2	23	----	----	13	2	6	1	1
13	12	20	3	----	----	5	29	1	32	3	----	13	5	13	1	3
14	11	30	2	----	----	10	33	----	41	2	----	11	14	14	3	1
15	48	59	2	----	----	8	101	----	99	9	1	71	16	11	7	4
16	11	9	1	----	----	3	16	2	20	1	----	12	3	5	1	----
17	16	10	----	----	----	1	25	----	23	3	----	19	3	2	2	----
18	47	14	----	----	----	4	57	----	55	6	----	49	1	6	4	1
19	76	39	3	----	----	5	113	----	112	6	----	79	16	3	9	11
20	42	67	1	1	----	13	98	----	99	11	1	48	35	16	4	8
21	106	18	1	----	2	17	110	----	116	11	----	102	2	16	6	1
22	233	55	1	1	3	23	269	1	220	71	2	221	6	44	9	13
23	139	13	1	1	2	3	153	----	134	22	----	134	1	10	2	9
24	68	82	4	----	2	24	131	1	142	14	----	71	38	22	10	15
25	72	23	----	2	1	3	94	1	79	18	1	80	5	6	4	3
26	105	61	1	1	3	32	139	----	152	17	2	119	16	25	10	1
27	49	12	----	----	----	2	59	----	24	36	1	46	5	3	5	2
28	68	67	1	----	2	20	118	----	112	26	----	78	25	20	4	11
29	35	38	3	2	2	6	74	----	75	5	----	53	11	11	2	3
30	17	43	2	----	----	12	50	----	58	3	1	17	14	22	5	4
31	45	22	2	1	----	5	65	----	65	5	----	51	6	5	5	3
32	53	110	2	----	1	29	134	3	133	32	1	55	37	46	8	20
33	132	39	----	----	2	7	166	----	153	18	2	133	8	17	7	8
34	85	36	----	----	1	13	109	----	63	55	4	103	9	3	1	6
35	390	15	----	----	3	13	393	2	134	272	2	384	1	10	4	9
36	69	78	3	----	7	20	131	6	128	28	1	75	27	34	8	13
37	29	15	----	----	----	3	41	----	38	5	1	30	4	5	1	4
38	187	49	----	2	----	22	215	1	203	33	2	204	16	9	7	2
39	120	51	1	----	----	34	136	2	165	5	2	133	9	19	7	4
40	97	28	3	----	1	16	113	----	104	24	1	98	4	15	4	8
41	163	13	----	----	----	23	152	1	77	95	4	155	3	7	5	6
42	120	7	----	----	----	5	121	1	109	16	2	119	----	4	2	2
43	88	15	2	----	----	10	95	----	92	12	1	87	6	4	1	7
44	26	57	2	----	----	8	76	1	71	13	1	35	16	16	10	8
45	90	15	----	----	----	2	101	2	64	41	----	99	3	1	1	1
46	182	14	----	----	----	8	187	1	90	105	1	182	6	1	4	3
47	30	57	1	----	----	11	77	----	74	14	----	27	32	13	9	7
48	68	23	1	----	2	11	83	----	62	30	2	67	6	13	4	4
49	119	7	----	----	----	3	122	1	98	28	----	120	4	----	2	----
50	141	7	----	----	----	3	145	----	108	40	----	140	2	----	4	2
51	108	20	1	----	----	13	113	3	105	23	1	111	6	3	3	6
52	76	31	1	----	2	8	100	2	53	56	1	86	12	6	3	3
Total	3,692	1,468	49	13	38	510	4,713	37	3.978	1.242	40	3,851	462	525	196	22

The question about smallpox vaccination added very little new information except that it showed the level of vaccination was slightly lower than the level of diphtheria immunization. In this instance the question could have been omitted from the questionnaire without great loss.

The pattern seen in diphtheria protection was repeated for medical antepartum services and for medical check-ups of infants. Thus, in general, white mothers and their infants received extensive preventive services primarily from their own doctors while Negro mothers and their babies received much less both in quantity and quality, and the services were provided primarily by health centers and hospitals.

Public health nursing services present a different pattern, which is the result of case selection by the agency presumably on the basis of need rather than from the choice of the parent. Ninety-one percent of Negro infants and 76 percent of white infants were visited at least once by a public health nurse. Only 7 percent of white mothers and 22 percent of Negro mothers received prenatal care. Both Negro mothers and infants were visited more frequently and earlier than those in white families. A great many of the visits to both mothers and infants were single visits. How valuable single visits are could not be answered by this study.

Study of the critical services on a basis other than racial selection can be illustrated by two examples:

Wards 17, 18, 25, 31 (table 2) were grouped and compared with wards 42 and 50 combined, and with the total Negro experience. There was a statistically significant difference in level of protection against diphtheria between the presumed more prosperous white

Table 3. *Level of protection of 1,468 children whose mothers received prenatal care from hospitals*

Question 1: Has this child received vaccination against diphtheria?

	Total	*Percent*	*Negro*	*Percent*	*White*	*Percent*
Yes	901	61.4	429	59.9	472	62.8
No	547	37.3	275	38.4	272	37.2
Not stated	20	1.3	12	1.7	8	1.0
	1,468	100.0	716	100.0	752	100.0
By whom?						
Own doctor	251	27.9	30	7.0	221	46.8
Health center	784	20.4	110	25.6	74	15.7
Hospital	425	47.2	267	62.2	158	33.5
Other	4	.4	--------	--------	4	.8
Not stated	37	4.1	22	5.2	15	3.2
	901	100.0	429	100.0	472	100 0
Visited by public health nurse before child was born?						
Yes	309	21.1	164	22.9	145	19.3
No	1,144	77.9	545	76.1	599	79.6
Not stated	15	1.0	7	1.0	8	1.1
	1,468	100.0	716	100.0	752	100.0
Visited by public health nurse after child was born?						
Yes	1,333	90.8	663	92.6	670	89.1
No	125	8.5	46	6.4	79	10.5
Not stated	10	.7	7	1.0	3	.4
	1,468	100.0	716	100.0	752	100.0
Regular medical check-ups by whom?*						
Own doctor	431	29.4	65	9.1	366	48.7
Hospital	404	27.5	262	36.6	142	18.8
Health center	391	26.6	262	36.6	129	17.2
Own doctor, hospital, or health center	123	8.4	55	7.7	68	9.0
Not stated	119	8.1	72	10.0	47	6.3
	1,468	100.0	716	100.0	752	100.0

*The answers to this question should be studied in relation to question 6 in table 1 in order that "not stated" totals can be adjusted.

children and the less advantaged. There was no difference between the latter group and the Negro experience.

In table 3 is recorded the results of a partial study of the mothers who received prenatal care by the hospitals and hence were presumed to have been screened by a means test. The white mothers in this group received three times the public health nursing services of the total white mothers, but their children were significantly less well protected against diphtheria than the total white infants. Half of these children received the service by hospitals in contrast to only 5 percent of all white children. Another pertinent detail is that, while all these mothers depended on the hospital for prenatal care, 47 percent of white parents obtained immunization and check-ups for the baby from their own doctor. No significant differences were observed between the Negroes in this group and the total Negroes.

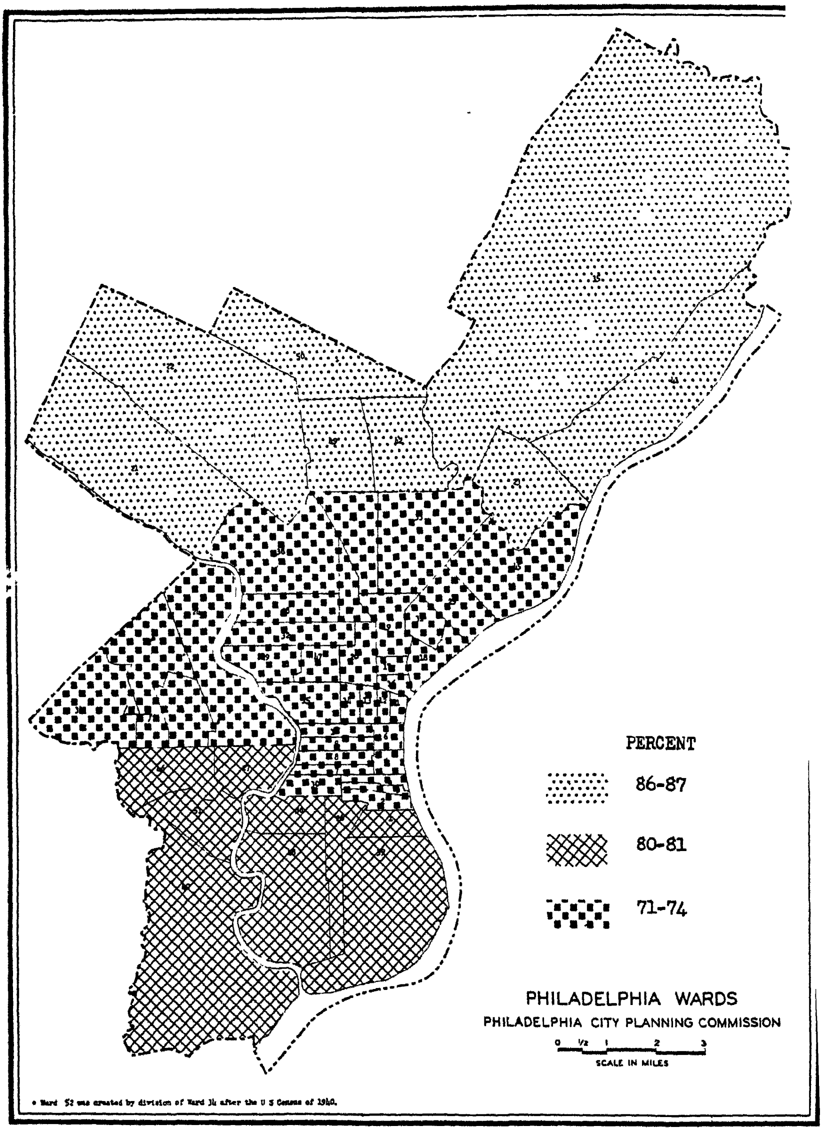
The pattern of use of the present facilities of the city can be outlined. The present health centers do not see more than 7 percent of all white infants and about a third of the Negro infants. Hospitals furnish practically all the public prenatal medical services. The hospitals provide about the same amount of medical supervision of infants as the health centers, but they immunize fewer.

A detailed analysis of the data by proposed health centers service areas contributed significantly to the development of that program. Table 4 and the chart illustrate the manner in which these data were studied. The use of the "minimum level of protection" and "maximum level of protection" and the "standard error" in table 4 was considered of importance because of the inability to locate 15 percent

Table 4. *Results of sample study by proposed health center service areas for diphtheria*

Areas	Wards	Questionnaires mailed	Yes	No	Not stated	Undelivered [1]	Minimum level of protection [2]	Sample level	Standard error	Maximum level of protection [3]
									Percent	
Northeast	23, 35, and 41	816	632	103	5	76	77.5	0.86	0.2	87.4
Kensington	43, 33, 45, 25, 37, 19, 31, 18, 17, 20, and 16.	1,126	661	264	7	194	58.7	.71	.6	76.6
Germantown	21, 22, 50, 49, and 42	902	701	107	13	81	77.7	.87	.4	88.1
North Philadelphia, west.	38, 28, 32, 29, and 47	894	501	201	8	184	56.0	.71	.8	77.5
Central City, Philadelphia.	15, 14, 13, 12, 11, 10, 9, 6, 8, 7, 5, 30, 2, 3, and 4.	533	279	114	3	137	52.3	.71	1.0	78.6
West Philadelphia, north.	24, 34, 52, and 44	601	347	122	4	128	57.7	.74	.9	79.7
West Philadelphia, south.	46, 27, 51, and 40	615	415	95	5	100	67.5	.81	.7	84.6
South Philadelphia	36, 26, 48, 1, and 39	761	530	133	10	88	69.6	.80	.5	82.5
Total		6,248	4,066	1,139	55	988	65.1	.78	.2	81.8

[1] Uncooperative included with undelivered.
[2] Assuming "not stated" and "undelivered" were "no."
[3] Assuming "not stated" and "undelivered" were "yes."


PERCENT
86-87
80-81
71-74
PHILADELPHIA WARDS
PHILADELPHIA CITY PLANNING COMMISSION
0 1/2 1 2 3
SCALE IN MILES
• Ward 52 was created by division of Ward 34 after the U S Census of 1940.

Level of protection of 1-year-old children against diphtheria by percent.

of the sample which was somewhat concentrated in disadvantaged sections. In this table the standard error is used to express the magnitude of the variation of the true percent protected from the percent obtained in the sample which results from failure to obtain response from the total population to whom questionnaires were mailed. It assumes (1) that people who did not respond differ in no way from people who did; (2) that the whole population under consideration is the same as the population of the 2-month period; (3)

that all answers are truthful. In an evaluation of the foregoing assumptions, it is very likely that the people who did not respond differ from those who did, and the true percent is probably lower than that obtained; however, without applying the standard error to the levels found in the study, the true percent can be no lower than the minimum level of protection expressed in the table, nor by the same line of reasoning, higher than the maximum level expressed in the table. Similar tables were prepared for nursing services (table 5) which provided possible ranges as indicated above.

It is recognized that these analyses barely scratch the surface of the potential contributions these data could make. Detailed specific data are at hand for exploring why some children are not immunized, the values of infrequent routine public health nursing visits, and relationships of public health services and medical care.

Table 5. *Results of sample study by proposed health center service areas by nursing visits*

Areas	Visited by public health nurse before child was born									
	Wards	Questionnaires mailed	Yes	No	Disposition not stated	Undelivered	Minimum visits [1]	Maximum visits [2]	Sample level	Standard error
										Percent
Northeast	23, 35, and 41	816	39	698	3	76	4.8	14.5	0.05	0.06
Kensington	43, 33, 45, 25, 37, 19, 31, 18, 17, 20, and 16.	1,126	56	871	5	194	5.0	22.6	.06	.09
North Philadelphia, west.	38, 28, 32, 29, and 47	894	88	618	4	184	9.8	30.9	.12	.6
Germantown	21, 22, 42, 49, and 50.	902	51	767	3	81	5.7	15.0	.06	.06
Central City Philadelphia.	15, 14, 13, 12, 11, 10, 9, 6, 8, 7, 5, 30, 2, 3, and 4.	533	67	325	4	137	12.6	39.0	.17	1.0
West Philadelphia, north.	24, 34, 44, and 52	601	53	416	4	128	8.8	30.8	.11	.7
West Philadelphia, south.	27, 40, 46, and 51	615	39	472	4	100	6.3	23.3	.08	.5
South Philadelphia	1, 26, 36, 39, and 48	761	117	546	10	88	15.4	28.3	.18	.5
Total		6,248	510	4,713	37	988	8.2	24.6	.10	.04

Areas	Visited by public health nurse after child was born							
	Yes	No	Disposition not stated	Undelivered	Minimum visits [1]	Maximum visits [2]	Sample level	Standard error
								Percent
Northeast	345	389	6	76	42.3	52.3	0.47	0.6
Kensington	800	126	6	194	71.0	88.8	.86	.5
North Philadelphia, west	597	110	3	184	66.8	87.7	.84	.6
Germantown	651	166	4	81	72.2	81.6	.80	.4
Central City Philadelphia	353	39	4	137	66.2	92.7	.90	.8
West Philadelphia, north	329	138	6	128	54.7	77.0	.70	1.0
West Philadelphia, south	323	188	4	100	52.5	69.4	.63	.9
South Philadelphia	580	86	7	88	76.2	88.7	.87	.5
Total	3,978	1,242	40	988	63.7	80.1	.76	.2

[1] Assuming "not stated" and "undelivered" were "no."
[2] Assuming "not stated" and "undelivered" were "yes."

One of the unexpected contributions to the study which was not anticipated was the large number of unsolicited comments received. A number of answers indicated that persons could not afford the services of a private physician and had to rely on health centers and hospital clinics for maternal and child hygiene care. Where health centers were available and were used, general satisfaction with their services was expressed. A number of answers indicated concern that health centers were not available. There was some evidence of a need for community education regarding clinic locations and services in areas where well-baby clinics are in operation. Generally, the comments indicated an interest in the health facilities provided and a readiness to use them.

Discussion

The method reported in this paper seemed particularly useful in overcoming a major handicap in the evaluation of public health services by securing reasonably accurate data concerning the services of private physicians. It should be emphasized that data regarding services provided by private physicians were obtained in the following details: (*a*) percentage of prenatal services provided; (*b*) month prenatal services were begun; (*c*) percentage of regular check-ups of infants; (*d*) frequency of regular check-ups of infants; (*e*) percentage of immunizations; (*f*) details of all of these services by color and ward.

Such questions have been the concern of health officers for years. They have been important items in the Evaluation Schedule,[2] but they have also been among the most difficult to answer and have commonly been reported as "data lacking." One of the methods attempted has been to ask private physicians to report immunizations, visits of well babies, etc. This has rarely produced reliable data and has proved to be a burden. The periodic application of the method of this study would seem to make any such permanent reporting system unnecessary.

The method also appears to be of use in obtaining more accurate data regarding the percentages of expectant mothers and infants served by the public health facilities, since it investigates a specifically identified group. Comparison of vital statistics and activity reports permits an approximation of the percentage such as the number of infants served related to the number of births of the period involved. It has rarely been possible, however, to relate the service data precisely to any one group of infants, since some served were born in the year previous and some of the current group will be served in the year following. The method of this study overcomes this difficulty.

There would seem to be real values in the periodic application of this method. Experience with the Evaluation Schedule has indicated that about every 3 years is a practical frequency to explore the basic indices. However, special indices such as changes by ward, color, or among special groups may be more sensitive to changes of practice and it may thus be indicated to all or part of such a study oftener than every 3 years.

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[2] Committee on Administrative Practice: Evaluation Schedule, American Public Health Association, 1790 Broadway, New York 19, N. Y., 1947.

Summary

1. A sampling method is presented of obtaining essential data regarding such critical indices of public health as level of immunization and medical and public health nursing services to antepartum mothers and to infants.
2. The method appears to have reasonable and useful reliability, particularly with regard to patterns of practice.
3. In the city studied by the method, white mothers and their infants received extensive preventive medical services, primarily from their own doctors, while Negro mothers and their infants received much less both in quality and quantity, and the services were provided mostly by health centers and hospitals.
4. About 10 percent of all mothers received antepartum public health nursing services—22 percent of Negro mothers and 7 percent of white mothers. Seventy-six percent of all mothers and infants received public health nursing services after the baby was born (90 percent of Negroes and 72 percent of whites) with nearly half the service in the first month. More than three nursing visits were uncommon and in one-half the families there was a single visit. Preliminary study showed some selection of cases on the basis of need. No correlation was found between public health nursing visits and level of immunization.

APPENDIX A

Sample of Questionnaire

Dear Mrs. ---------:

Since -------- is now about one year of age we wish to offer our congratulations, and we hope that this first year has been a healthful one for both of you.

We are making a study to learn how well health services are being provided in Philadelphia and how mothers and children can best be served. You can be of assistance as the mother of a one-year-old by supplying us with some information. The Department of Public Health wishes to continue to play its part in improving health services for children. Would you please fill in the questions listed below and return this letter to us in the enclosed envelope?

1. Has this child received *vaccination* against: (Check correct answer)
   Diphtheria ---- (Yes) ----- (No). If yes, by whom? Own Doctor ---- Hospital ----
   Health Center -----. How many doses? ---------

2. Has this child received *vaccination* against: (Check correct answer)
Smallpox ---- (Yes) ----- (No). If yes, by whom? Own Doctor ---- Hospital ----
Health Center -----.

3. Who took care of you during this pregnancy? (Check one).
Your Own Doctor ---- Hospital ---- No One -----.
How many months were you pregnant before you saw your doctor? 2 3 4 5 6 7 8 9 10 (Circle one).
About how many times did you see the doctor? ---------.

4. Were you visited by a public health nurse (in a blue or gray uniform) *before* this child was born? ---- (Yes) ----- (No). If yes, how many times did the nurse visit you? ---------.

5. Did a public health nurse visit you in your home *after* this child was born? ---- (Yes) ----- (No). If yes, how old was this child at the first visit? -----------.
How many visits were there? ---------.

6. About how many times has this child received regular medical check-ups? -----.
By Whom? Own Doctor ---- Hospital ---- Health Center -----.

This information will be used to improve health services for the children in Philadelphia. It will be appreciated if you return the filled-in questionnaire to us promptly.

Very sincerely yours,

P. S. If you have any suggestions for the improvement of child-care services, will you please write them on the other side of this page.

Activities of a Mental Health Nurse

By ADELE L. HENDERSON, R. N.*

A mental health nurse has been included as a member of the staff of the Prince Georges County Mental Health Clinic, augmenting the traditional team of psychiatrist, psychologist, and psychiatric social worker. It was considered important that the nurse have education and experience in both public health and psychiatric nursing, especially since each staff member had the responsibility of exploring his own profession to see how he might best cooperate with the other members in planning community mental health activities.

The nurse chiefly has served in a liaison capacity for the clinic in its relationship with the existing community nursing groups in health activities. Conferring with the public health nurses regarding patients referred to the mental health clinic was one of her preliminary steps in this role. She discovered that nurses wanted to discuss how they might help the patient and the patient's family during and after the clinic contact. One conference with a nurse disclosed a mother's inability to accept emotionally her child's mental retardation. As the nurse talked about this family, she began to see that seeking consultation from several psychological clinics (subsequent to the mother's contact with the mental health clinic) was a necessary process rather than the mother's intent to be "uncooperative". By realizing what this experience meant to the mother, the nurse was able to understand why this mother needed more time to accept her child's limitations.

The mental health nurse took part in the in-service educational program of the county health department which was planned around nursing relationships. Here the more formalized method of lecture or report, often the procedure in such staff meetings, was modified. A brief report on reading material was used as an approach to stimulate informal discussion by the group. Discussions centered around health problems which the nurses considered important and the community resources they used to meet these problems. Out of discussions, group and individual, grew mutual recognition of areas where mental health activities might be effective.

Prenatal and child health conferences have long been identified with preventive public health measures. Accordingly, thought was given to tools that might be used as preventive mental health services in these clinic settings. It was believed that informal discussion groups for mothers attending clinics would give them an opportunity to share ideas and experiences. Mothers have something to offer each other, and group discussion of mutual interests is more helpful than being talked at or lectured to by someone labeled as an authority on health matters.

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*Prince Georges County Mental Health Clinic. This is the third in a series of articles about the Prince Georges County Mental Health Clinic, a demonstration sponsored jointly by the Public Health Service and the Maryland State Department of Health.

The possibilities of this method were discussed with the county health officer and the public health supervisory staff. Small discussion groups for mothers were initiated in two of the county clinics, one a weekly prenatal and child hygiene clinic in an urban area and the other a monthly child hygiene clinic in the southern and rural part of the county. Since the mothers usually waited for a varying period of time to see the physician, a group of seven or eight of the interested mothers together with the nurse used this period to discuss informally common problems. The make-up of the groups in both clinics varied according to the frequency of appointments which, in turn, were dependent upon the age of the child.

When the groups were formed, the nurse, after informal introductions, began by talking for a few minutes about some aspect of child care or by relating a family experience that might stimulate discussion. Usually a member in the group commented and elaborated upon a point. Gradually, the scope of discussion enlarged. After several months the groups were a new experience to only a few of the mothers, and discussion grew more spontaneously out of their own interests, sometimes beginning with a comment made or a question asked by one of the members. Discussion moved with varying degrees of vigor, dependent upon the experiences and attitudes of those in the group.

Recently in the weekly clinic, the county health department set aside two clinic days during the month for prenatal patients exclusively. It therefore became possible to have groups of prenatal patients alone, and the focus of discussion changed from matters centering around infant and child care to pregnancy and the meaning of the pregnancy to the mother and her family.

Mrs. C. had participated in several group discussions and, not knowing in advance of the change in clinic schedule, had arrived for the 3-month examination of her 1-year-old child. Finding herself in a group with seven prenatal patients, she remarked that she seemed to be the only one who was not there "for herself". Turning to her neighbor, she asked if the expected baby would be the first child in the family. The affirmative answer provoked response from several others in the group about their past and present pregnancies.

One mother mentioned her 4-year-old child's observation of her apparent gain in weight. Several others had had similar experiences, and they exchanged remarks made by children in the family about the expected baby. One mother said her 5-year-old asked her if she was going to have a new baby, after he had overheard a conversation. She felt that sharing this knowledge would help him later to accept the new baby and show less jealousy toward it. Few believed their children related the expected baby to the change in the size and shape of the mother, and Mrs. X was firm in her belief that there was a "proper time" for a child to be given information regarding reproduction.

Mrs. C said that her boy, who was 6 when the baby was born, had asked several questions that were embarrassing to her. She had put him off by saying they would discuss the question at some future time. He had known they were going to have a baby because "he had asked for one," but when he wondered regarding the origin of the baby she had not known what to tell him. At several points the group responded with embarrassed smiles and short laughs, and it was felt that some of the mothers were hesitant to talk freely at this point.

When Mrs. X said that she had told her two daughters ages 8 and 9 she would be going to New York in a few months to bring a baby back with her, Mrs. C. wondered if it were right to be purposefully untruthful. A member, who had thus far remained out of the discussion, said this was her first pregnancy, and because she lacked information she had read some books. She said if mothers drew away from an honest discussion about pregnancy, a child might feel there was something wrong in having a baby—almost as if it were "dirty". "It *is* dirty," said Mrs. X, and another mother commented in a casual manner, "It's being done and it has been done for a long time." The tension was broken with laughter, and the mothers seemed more at ease, which resulted in several others expressing a feeling of inadequacy in their ability to answer questions about reproduction. Mrs. C. went a step further by saying she supposed her lack of knowledge had been the reason for her embarrassment when her child had asked questions. A simple diagram of the female organs of reproduction was drawn by the nurse. Group interest was intense. When asked if it might be helpful to see a motion picture presenting more complete information, the group assented in chorus.

Several weeks later a film was shown to a prenatal group of 22. While it was felt the film available for such a purpose was rather technical for this group, the response following the showing indicated that an expressed need and interest had been met. As one mother remarked, "It all seems so much more natural, and it makes talking much easier."

Through the discussion and the film these mothers probably will find it easier to answer their children's questions about reproduction, thus lessening one of the frequent causes of friction in family relationships. Group discussions have brought out the ideas and feelings of the mothers participating, and they have learned from each other. In talking about infant feeding on one occasion, a mother said she thought that even a small baby knew if he were wanted and loved, for he could sense his mother's feelings even though he could not understand her words. In a discussion of the father's role in the family, one mother told the others that she felt it was important for a father to feel useful to his baby from the beginning. Others agreed. The mother of four children said an inexperienced father could be helped to feel more at ease by performing some of the daily care for his baby, thus helping him to feel closer to the baby and leading to better family feeling. There is general agreement today that the mental health of an individual is rooted in his early family relationships and, therefore, any lessening of the fears and tensions of parents has an effect upon the mental health of the whole family.

The seminar method is neither new nor unusual. Various States have conducted institutes for groups of professional health workers and have found small discussion groups effective in the process of developing human relations. It is equally applicable to other settings —to venereal disease, tuberculosis, and sight-saving clinics. In Prince Georges County the discussion groups have grown out of an apparent need. Our experience indicates that parents are interested in their children and will cooperate in any program designed to help them in everyday situations. Recently, the county health officer, in planning for new maternal and child health conferences in the county, included discussion groups as part of his total plan.

The nurse has specific responsibility in relation to individual patients being treated in the mental health clinic. Patients are assigned to the nurse when a need is felt for nursing skills in carrying out the psychiatric treatment plan.

A fastidious mother, with feelings about cleanliness that involved frequent use of disinfectants, soap, and water, visited the clinic regularly for psychiatric interviews. Although meticulous housekeeping had been necessary to her for years, her pattern of living had become more involved because of the arrival and care of her first baby. She became aware that her feeling about germs was restricting the activity of her year-old baby. It was decided that along with psychiatric treatment, the nurse could give this mother help with everyday situations in the home, for the needs of the growing child must be considered in the treatment plan.

The first visit to the home revealed a healthy, active child who was kept within the limited boundaries of crib and play pen. She was fed each spoonful of food to prevent soiling her clothes, and she could not throw a toy to the floor and use it again until it had been disinfected. This mother had a deep and real love for her baby and feared these restrictions might handicap the baby by preventing her from playing like other children.

Acceptance by both the mother and the nurse of the reality of the mother's fastidiousness enabled the mother gradually to allow the baby more freedom.

The baby had never been on the floor and had learned to walk on the bed. The first apparent gain was made when the mother was able to allow her the freedom of walking on the floor of the long, narrow hallway after the floor had been thoroughly cleaned. The hall was walled off from the other rooms in the apartment by doorway gates, but the way the baby ran the length of the hard floor surface indicated a lively appreciation of added space.

The next gain was made when the mother could allow her to walk outdoors, although the outdoor apparel was removed immediately upon reentering the apartment and was kept on a newspaper in a special niche in the coat closet. With each step the mother was given the praise and approval due her, and an understanding of her difficulty in doing these things was expressed. In discussing each new step the nurse asked "Do you think you could?" rather than urging that a thing be done.

The mother is still a very thorough housekeeper but is able to push aside many of her household duties to spend time outdoors with her child. At the age of 2 the child is walking and active, and her mother is able to allow barefoot and exploratory play comparable to that of other children her age. There are still certain restrictions, but as the mother talks over everyday events with the nurse she shows increased evidence of weighing things in terms of precautionary measures that are for her child's welfare against those which are the result of her own feelings regarding cleanliness.

Slow and difficult as the process has been, a real sense of accomplishment was felt when the patient told the psychiatrist, "I feel easier for several days after the nurse's visit." It is apparent that as a result of clinic treatment both parent and child show less tension than when first seen.

Since the mental health of the small child is dependent upon the relationship to the mother and the environment, any help given to the mother which will decrease her tension in handling the child or will improve the opportunity for the child to experience spontaneous relationships with other children is beneficial.

The mental health nurse uses her nursing skills and her knowledge of mental hygiene in a community mental health clinic both in her activities in the community and in giving nursing care to patients referred to the clinic. Her case load is more specialized than that of a nurse in a generalized family health service, but like nurses in all health programs her work is essentially with the daily lives of people.

A few of the activities of the mental health nurse have been pointed out. There have been many other activities—participation in mental health institutes for public health nurses and in nursing conferences, meeting with community groups and organizations interested in health, and collaborating in the community activities carried on by the entire staff of the mental health clinic. From these experiences has come an increased realization that knowledge of mental health and an understanding of the basic needs of people are essential to a public health nurse. She needs more than a modernized outline of things-to-say and things-to-do that are aimed toward the promotion of mental health. Her everyday work carries her into the lives of people in a natural way, and her services are given to individuals and their families. The nurse's interest is in the person rather than the procedure. Mental health knowledge enriches her nursing skill by increasing her awareness of the patient as a person, and she gains more satisfaction from the service she gives.

OTHER ARTICLES IN SERIES

(*1*) Davens, Edward and Lemkau, Paul: Birth of a community mental health clinic. Pub. Health Rep. **64**: 657 (1949).

(*2*) Ross, Mabel: Pilot mental health clinic. First annual report of Prince Georges County clinic. Pub. Health Rep. **64**: 797 (1949).

Seasonal Changes in Abundance of Fleas on Rats at Baltimore, Md.

By JAMES YEH and DAVID E. DAVIS*

The collection of a series of rats from poultry warehouses in Baltimore provided an opportunity to compare the number of fleas on rats during different times of the year. This report describes the changes and comments on the relation to climate.

Trapping in poultry warehouses began January 7, 1946, and continued until March 3, 1947. Steel traps were placed along runways and at holes late in the afternoon. The captured rats, dead or alive, were picked up early each morning and brought into the laboratory, each in a separate bag with a tag indicating location and date. While in the bags, the live rats were chloroformed. Each rat was combed into a white basin, and the bags were turned inside out to collect all ectoparasites. Rats found dead in the traps were not combed.

These poultry warehouses are located in old, dilapidated buildings near the markets. The poultry are kept in cages for several days before slaughtering. There is an abundant supply of chicken mash and water, as well as an occasional dead chicken. Each warehouse was trapped for 10 to 14 days each month. Care was taken not to overtrap and reduce the population. An analysis of the data for rats per trap night indicates that no great change in population occurred. Hence these rats were derived from a homogeneous habitat and a relatively constant population.

A total of 3,520 fleas was recovered from 526 infested rats, out of the 966 live rats captured. The fleas were either mounted on permanent slides or cleared with 10 percent KOH, and then were identified.[1]

Seasons of the Year

Weather records from the Monthly Meteorological Summary, issued by the Weather Bureau of the United States Department of Commerce, at Baltimore, Md., were used to determine the weekly mean temperatures and total weekly precipitation from January 1, 1946 to March 3, 1947. When plotted (fig. 1) it is possible to divide the year into seven seasons, each having relatively homogeneous temperature and rainfall conditions. The characteristics of these seven seasons may be summarized as follows: The hibernal season (1946) was cold and had considerable precipitation; the prevernal season was warmer and had about the same precipitation; the vernal season was still warmer and had heavy rainfall in several weeks; the estival season was hot, with considerable rain; the postestival season was slightly cooler, with several very dry weeks; the serotinal season was cooler and moderately wet; the autumnal season was short, cool, and dry; the hibernal season (1946–47) was cold and wet. The rats for this study were collected inside and, since the doors of these poultry houses were usually open and there was no central heating system, the weather within the poultry warehouses changed from season to season.

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*Rodent Ecology Project, Department of Parasitology, School of Hygiene and Public Health, The Johns Hopkins University. This work was conducted under a grant from the International Health Division of the Rockefeller Foundation.

[1] Identification of fleas was done under the guidance of Dr. L. E. Rozeboom, School of Hygiene.

A total of 966 live rats of the species, *Rattus norvegicus*, was captured during the whole year survey. A total of 526 (54.5 percent) of the captured rats was found infested with fleas. Of the 966 rats trapped, 458 (47.3 percent) weighed between 0–199 gm., 414 (42.8 percent) weighed between 200–399 gm., and 94 (9.7 percent) weighed more than 400 gm. The sex ratio was 54.5 percent male. Of the 3,520 fleas identified in the present study, 1,603 (45.4 percent) were *Xenopsylla cheopis;* 1,557 (44.1 percent) *Nosopsyllus fasciatus;* and 360 (10.5 percent) *Leptosylla segnis.* In addition, 1 individual of *Pulex irritans* and 15 specimens of *Ctenocephalus felis* were collected.

Table 1. *Seasonal prevalence of* X. cheopis

Sex and weight		Hibernal	Prevernal	Vernal	Estival	Postestival	Serotinal	Autumnal	Hibernal (46–47)	Total
	Males									
0–199 gm	Number examined	24	46	24	31	35	55	11	6	232
	Fleas per rat	0.3	(*)	0.1	3.3	1.3	1.3	1.6	1.6	1.1
	Percent with fleas	20.8	2.2	4.1	51.6	25.6	23.6	54.6	16.6	22.4
200–399 gm	Number examined	30	47	20	49	21	29	13	21	230
	Fleas per rat	.9	(*)	.6	4.2	2.7	4.7	3.4	.4	2.0
	Percent with fleas	23.3	2.1	15.0	57.1	33.3	58.6	69.2	19.0	33.5
400 gm	Number examined	8	18	3	7	16	3	3	7	65
	Fleas per rat	0	.1	------	7.3	1.3	------	------	.3	1.7
	Percent with fleas	0	5.5	------	57.1	25.0	------	------	28.6	26.1
	Females									
0 199	Number examined	31	43	16	34	38	49	12	4	227
	Fleas per rat	.5	0	.2	3.6	.6	2.2	2.5	------	1.3
	Percent with fleas	16.1	0	12.5	67.6.	5.2	28.6	66.6	------	24.6
200-399 gm	Number examined	29	26	23	51	20	20	10	4	183
	Fleas per rat	.2	.1	.3	4.0	2.0	3.1	4.2	------	2.1
	Percent with fleas	13.8	3.8	17.4	53.0	50.0	45.0	70.0	------	34.9
400 gm	Number examined	2	5	0	11	3	4	2	2	29
	Fleas per rat	------	------	------	1.4	------	------	------	------	1.7
	Percent with fleas	------	------	------	36.3	------	------	------	------	44.8
Total male and female	Number examined	124	185	86	183	133	160	51	44	966
	Fleas per rat	.5	(*)	3	3.9	1.4	2.7	2.9	1.0	1.6
	Percent with fleas	17.7	2.1	12.7	55.7	25.6	36.8	64.7	29.5	54.4

*Means less than 0.05.

Seasonal Changes in Flea Indices

Although the two indices for indicating the number of fleas on rats are unsatisfactory *(2)* the mean number of fleas per rat (flea index) and the proportion of rats having fleas (infestation rate) will both be used until better methods are devised. The mean number of female fleas per rat, recommended by Cole *(1)* was not used because the small number of infested rats (54.4 percent) did not permit adequate evaluation of this new index. Furthermore, one object of this study was to compare the seasonal changes in abundance with those in nearby cities. Persons interested in the Cole index may calculate it from the tables.

The data for the three species of fleas are given in tables 1, 2, and 3 according to seasons and to weight and sex of rat. The infestation rate or flea index was not calculated when less than six live rats were examined, although such records are used in the totals.

Xenopsylla cheopis. The data in table 1 show the minimum numbers in the prevernal season, a maximum in the estival season, a decline in the postestival and then another maximum in the autumnal season. No difference in the flea index or the infestation rates between the male and female rats is apparent. There is some increase of fleas correlated with the increase in size of rat.

Table 2. *Seasonal prevalence of* N. fasciatus

Sex and weight		Hibernal	Prevernal	Vernal	Estival	Postestival	Serotinal	Autumnal	Hibernal (46–47)	Total
	Males									
0-199 gm	Rats examined	24	46	24	31	35	55	11	6	232
	Fleas per rat	1.1	3.6	2.0	.9	.1	.1	(*)	.2	1.2
	Percent with fleas	45.8	67.4	52.2	32.2	8.5	9.1	(*)	16.6	31.8
200-399 gm	Rats examined	30	47	20	49	21	29	13	21	230
	Fleas per rat	2.5	6.3	6.3	1.1	.1	.1	1.5	1.2	2.6
	Percent with fleas	60.0	61.7	80.0	42.8	9.5	6.6	46.1	47.6	45.2
400 gm	Rats examined	8	18	3	7	16	3	3	7	65
	Fleas per rat	.3	4.0	------	1.8	.1	------	------	(*)	1.7
	Percent with fleas	25.0	66.6	------	71.4	6.2	------	------	14.2	38.4
	Females									
0-199 gm	Rats examined	31	43	16	34	38	49	12	4	227
	Fleas per rat	1.0	1.9	2.2	.8	(*)	.3	1.8	------	9
	Percent with fleas	51.6	48.8	43.7	29.4	2.6	12.2	41.6	------	30.8
200-399 gm	Rats examined	29	26	23	51	20	20	10	4	183
	Fleas per rat	2.1	3.2	3.0	1.5	0	.2	.4	------	1.6
	Percent with fleas	51.7	42.3	65.2	37.2	0	10.0	30.0	75.0	37.1
400 gm	Rats examined	2	5	0	11	3	4	2	2	29
	Fleas per rat	------	------	------	3.7	------	------	------	------	1.1
	Percent with fleas	------	------	------	36.3	------	------	------	------	27.6
Total, male and female	Rats examined	124	185	86	183	133	160	51	44	966
	Fleas per rat	1.6	3.8	3.3	1.2	(*)	.2	.1	.9	1.6
	Percent with fleas	50.8	57.2	59.3	27.7	5.2	11.2	31.3	43.1	36.1

*Means less than 0.05.

Table 3. *Seasonal prevalence of* L. segnis

Sex and weight		Hibernal	Prevernal	Vernal	Estival	Postestival	Serotinal	Autumnal	Hibernal (46–47)	Total
Males										
0–199 gm	Number examined	24	46	24	31	35	55	11	6	232
	Fleas per rat	(*)	2.0	1.2	0	0	0	0	0	.5
	Percent with fleas	4.2	15.2	20.8	0	0	0	0	0	5.6
200–399 gm	Number examined	30	47	20	49	21	29	13	21	230
	Fleas per rat	(*)	1.5	2.4	0	0	.3	0	0	.7
	Percent with fleas	6.6	17.0	19.0	0	0	3.4	0	0	10.8
400 gm	Number examined	8	18	3	7	16	3	3	7	65
	Fleas per rat	0	5	------	0	0	------	------	0	(*)
	Percent with fleas	0	5.5	------	0	0	------	------	0	.2
Females										
0–199 gm	Number examined	31	43	16	34	28	49	12	4	227
	Fleas per rat	(*)	.2	1.0	0	0	0	0	------	.1
	Percent with fleas	3.7	7.0	12.5	0	0	0	0	------	4.4
200–399 gm	Number examined	29	26	23	51	20	20	10	4	183
	Fleas per rat	(*)	5	.6	0	0	1.7	0	------	.3
	Percent with fleas	3.4	3.8	17.4	0	0	10.0	0	-----	6.0
400 gm	Number examined	2	5	0	11	3	4	2	2	29
	Fleas per rat	------	------	------	0	-----	-----	-----	-----	0
	Percent with fleas	------	----	------	0	-----	-----	-----	------	0
Total male and female	Number examined	124	185	86	183	133	160	51	44	966
	Fleas per rat	(*)	1.0	1.3	0	0	.2	0	0	3
	Percent with fleas	4.0	10.8	17.4	0	0	1.8	0	0	4.5

*Means less than 0.05.

Nosopsyllus fasciatus. The data in table 2 show the maximum in winter and spring and the minimum in late summer. Males and medium sized rats had higher values, but the differences are not statistically significant.

Leptosylla segnis. The data in table 3 indicate that this species is always uncommon, but reaches its maximum in spring.

A comparison of figures 1 and 2 shows that *N. fasciatus* and *L. segnis* reach maximum abundance in the cool, wet seasons. The bimodal curve for *X. cheopis* is surprising and may reflect a relatively dry (except for 2 weeks) postestival season.

Comparison With Other Cities

Although it is not the object of this report to present an exhaustive comparison with other cities, it is pertinent to compare the flea counts in Baltimore with those in nearby cities. In Norfolk, about 100 miles to the south, Hasseltine (*3*) found *X. cheopis* abundant with a maximum in August and minimum in March, *N. fasciatus* common with a maximum about March, and *L. segnis* very uncommon.

In Philadelphia, 100 miles to the north, Vogel and Cadwallader (*4*) found *X. cheopis* abundant with a maximum prevalence from September to November, *N. fasciatus* common with maxima in May and October, and *L. segnis* very rare. Comparisons must be made with

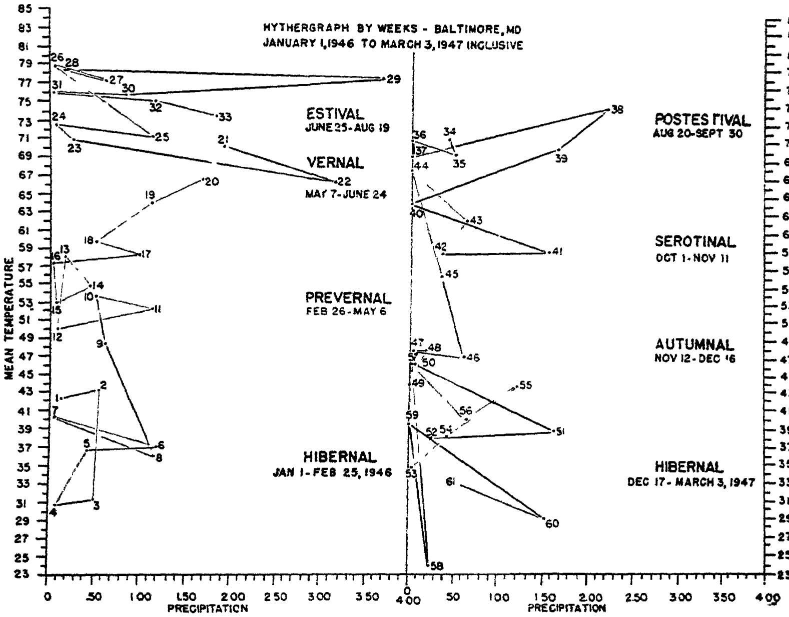

Figure 1. Hythergraph showing precipitation and temperature by weeks, 1946–47.

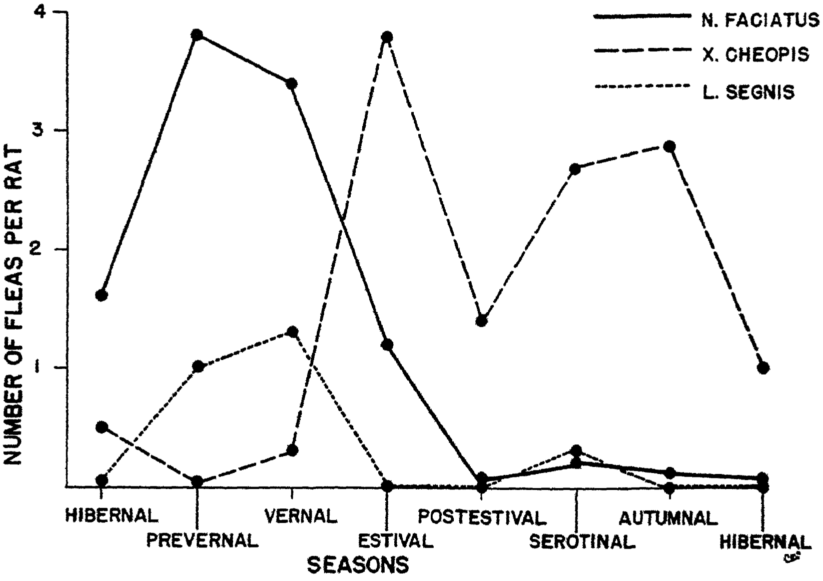

Figure 2. Seasonal changes in number of fleas per rat, Baltimore, Md.

caution because of differences in years and habitat of the rats, but it is clear that in this region *X. cheopis* is most common in summer and fall and that *N. fasciatus* is most common in spring. The greater number of *L. segnis* collected in 1946 in Baltimore in comparison with the very small number in nearby cities 10 to 20 years ago raises the question of a possible increase in *L. segnis* in recent years.

Summary

To determine the seasonal changes in numbers of fleas on rats, 966 Norway rats (*Rattus norvegicus*) were captured in poultry warehouses in Baltimore from January 7, 1946 to March 3, 1947. For analysis the data were divided into seven seasons according to temperature and precipitation.

The infestation by *Xenopsylla cheopis* was minimum in the prevernal season (2.1 percent of the rats infested), maximum in the estival (55.7 percent), declined in the postestival (25.6 percent), and again maximum in the autumnal (64.7 percent). The infestation by *Nosopsyllus fasciatus* was maximum in the hibernal (50.8 percent), prevernal (57.2 percent), and vernal seasons (59.3 percent), and minimum in the postestival season (5.2 percent). The infestation of *Leptopsylla segnis* was always small but was maximum in the vernal season (17.4 percent).

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED FEBRUARY 18, 1950

In the United States, reported incidence of influenza for the current week is more than twice the number of cases reported for the previous week and more than three times the number reported for the corresponding week last year. The total for the current week is 16,223 reported cases of influenza, for the previous week 7,967, and for the corresponding week last year, 4,792. The 5-year (1945–49) median for the week is 4,792 cases. The high corresponding week during the past 5 years was in 1948 when 11,234 cases were reported. The cumulative total for the calendar year is 49,640 cases of influenza as compared with 32,208 for the same period last year, and 37,425 for the corresponding median. The high year during the past 5 years was 1946 when 147,779 cases were reported during the first 7 weeks of the year.

The increase over the previous week in reported cases of influenza was not nation-wide, but was confined to West North Central (from 32 to 227), South Atlantic (from 1,731 to 3,005), West South Central (from 5,238 to 11,703), and Mountain Divisions (from 312 to 813).

In the West North Central Division, the increase was confined to North Dakota and Nebraska; in the South Atlantic, to Virginia and West Virginia; in the West South Central, to Arkansas, Oklahoma and Texas. The Mountain Division showed increases in Colorado, Idaho, Montana and Wyoming.

Other notifiable diseases in which increases were reported for the current week over the previous week were measles (6,564 to 7,136), pneumonia (2,335 to 2,524), and scarlet fever (1,871 to 2,005). The largest increase in reported cases of measles occurred in Indiana (47 to 306), Kansas (5 to 79), Nebraska (137 to 243), New Jersey (371 to 702), Pennsylvania (186 to 266), and Wisconsin (190 to 275).

Reported incidence of whooping cough with 2,701 cases for the current week decreased from last week, but remained above the corresponding week last year (976). The 5-year (1945–49) median for whooping cough is 2,095.

No smallpox was reported in the United States. Poliomyelitis decreased from 120 cases last week to 97 currently. For the corresponding week last year, 67 cases of poliomyelitis were reported.

Telegraphic case reports from State health officers for the week ended February 18, 1950

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	---	---	---	19	---	13	---	---	12	---	---	---	33	---
New Hampshire	---	---	---	1	---	1	---	---	2	---	---	---	1	---
Vermont	---	---	---	13	---	---	---	---	1	---	---	---	12	---
Massachusetts	2	1	---	150	3	---	---	---	141	---	---	1	138	---
Rhode Island	---	---	---	---	---	4	---	---	20	---	---	---	13	---
Connecticut	---	---	---	47	3	45	---	---	28	---	---	---	74	---
MIDDLE ATLANTIC														
New York	8	1	[2] 3	604	5	246	8	---	[3] 187	---	---	3	204	12
New Jersey	4	---	2	702	2	113	---	---	47	---	---	8	199	---
Pennsylvania	1	---	---	266	6	69	---	---	117	---	---	1	186	6
EAST NORTH CENTRAL														
Ohio	6	---	4	199	4	87	2	---	311	---	---	3	237	6
Indiana	4	---	---	306	1	3	2	---	43	---	1	1	49	12
Illinois	1	1	1	119	3	89	2	---	60	---	2	3	74	1
Michigan	3	---	---	1, 240	5	56	2	---	147	---	1	---	245	2
Wisconsin	---	---	31	275	---	21	---	---	102	---	---	1	187	---
WEST NORTH CENTRAL														
Minnesota	2	---	---	42	2	3	---	---	23	---	---	1	13	---
Iowa	---	---	---	795	2	2	2	---	15	---	---	---	23	4
Missouri	3	---	6	6	3	39	1	---	31	---	8	---	27	---
North Dakota	---	1	156	33	1	25	---	---	5	---	---	---	5	---
South Dakota	1	---	---	---	---	---	1	---	6	---	---	---	1	---
Nebraska	1	---	48	243	---	15	3	---	56	---	---	---	---	---
Kansas	1	---	17	79	---	15	2	---	42	---	---	---	5	---
SOUTH ATLANTIC														
Delaware	---	---	---	36	1	---	---	---	4	---	---	---	2	---
Maryland	3	---	5	35	1	41	4	---	33	---	---	2	89	---
District of Columbia	---	---	5	96	---	11	1	---	6	---	---	---	2	---
Virginia	6	---	2, 259	40	2	148	---	---	27	---	2	3	37	1
West Virginia	9	---	383	123	2	23	1	---	31	---	---	1	68	6
North Carolina	5	---	---	183	3	---	2	---	39	---	1	---	52	---
South Carolina	10	---	34	79	2	11	---	---	4	---	1	---	3	5
Georgia	6	---	319	44	4	18	2	---	8	---	2	2	7	10
Florida	2	---	---	16	---	10	6	---	9	---	---	---	3	3

EAST SOUTH CENTRAL														
Kentucky	3		6	86	3	60			44			1	23	
Tennessee	9		139	93	5		2		51			1	31	5
Alabama	4		256	22	3	39	1		18				18	5
Mississippi	3		15	68	1	25	2		5		1		1	9
WEST SOUTH CENTRAL														
Arkansas	1		361	5		53			6		1	4	49	3
Louisiana	2		6	26		22	3		3			3	4	
Oklahoma	8		356	13	1	100	2		27		1	3	29	9
Texas	25		10,980	213	5	912	14		33			3	168	15
MOUNTAIN														
Montana			335	34					29				3	
Idaho	1		102	9		13	5		12				2	
Wyoming			20	18	1	3	1		2					
Colorado			179	142		35	3		12			2	15	10
New Mexico	1			23		20			7		1		16	
Arizona	2		177	122		20			8			1	17	
Utah				142		5	1						21	
Nevada														
PACIFIC														
Washington			8	85	1	4	4		64				82	
Oregon			5	20	1	27	4		26				42	
California	9	2	5	224	6	78	14		101			2	185	
Total	146	6	16,223	7,136	82	2,524	97		2,005		22	50	2,701	121
Median, 1945–49	288	8	4,792	13,932	98		42	1	3,001	4	25	42	2,095	
Year to date, 7 weeks	1,190	73	49,640	36,829	611	16,202	801	6	11,976	[4] 9	168	318	17,051	969
Median, 1945–49	2,166	53	37,425	53,474	608		313	3	18,893	27	176	292	15,713	
Seasonal low week ends	(27th) July 9		(30th) July 30	(35th) Sept. 3	(37th) Sept. 17		(11th) Mar. 19		(32d) Aug. 13	(35th) Sept 3		(11th) Mar. 19	(39th) Oct. 1	
Since seasonal low week	5,470		80,170	55,959	1,524		42,283		28,415	[4] 17		3,691	38,587	
Median, 1944–45 to 1948–49	9,732		68,478	79,598	1,560		19,297		44,523	81		3,820	38,832	

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[1] Including cases reported as salmonella.
[2] New York City only.
[3] Including cases reported as streptococcal sore throat.
[4] Deduction: Missouri, week ended Feb. 4, 1 case.

Alaska: Pneumonia, 1 case.
Hawaii: Encephalitis 1, influenza 9, measles 1, whooping cough 1.

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—December 1949.—During the month of December 1949, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Panama City		Colon		Canal Zone		Outside the zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	4		2		6		1		13	
Diphtheria	5						3		8	
Dysentery.										
Amebic	3						5		8	
Bacillary	1				1		2		4	
Hepatitis, infectious	2						2		4	
Malaria [1]					3		73	1	76	1
Measles	1		30		24				55	
Meningitis, meningococcal								1		1
Mumps	2		25						27	
Pneumonia		5		4	15	2		6	[2] 15	17
Poliomyelitis					1				1	
Tuberculosis		12		4	7	2		8	[2] 7	26
Typhoid fever			1				2		3	
Typhus fever (endemic)			1						1	
Whooping cough				1	9				[2] 9	1
Yaws							2		2	

[1] 4 recurrent cases.
[2] Reported in the Canal Zone only.

NOTE.—Cases are listed by place of residence except when place of infection is known.

DEATHS DURING WEEK ENDED FEBRUARY 18, 1950

	Week ended Feb 18, 1950	Corresponding week 1949
Data for 94 large cities of the United States:		
Total deaths	9,346	9,819
Median for 3 prior years	9,819	
Total deaths, first 7 weeks of year	67,471	69,828
Deaths under 1 year of age	623	609
Median for 3 prior years	776	
Deaths under 1 year of age, first 7 weeks of year	4,408	4,760
Data from industrial insurance companies:		
Policies in force	69,864,655	70,616,279
Number of death claims	10,759	13,167
Death claims per 1,000 policies in force, annual rate	8.0	9.7
Death claims per 1,000 policies, first 7 weeks of year, annual rate	9.8	9.8

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended January 28, 1949.—During the week ended January 28, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox			28	1	326	439	72	65	73	91	1,095
Diphtheria			1		7	1	2				11
Dysentery, bacillary					11	2				1	14
Encephalitis, infectious							1				1
German measles			7		17	94		26	292		436
Influenza			23			18	2				43
Measles			15		325	501	50	44	66	165	1,166
Meningitis, meningococcal							1			1	2
Mumps			92			659	7	29	81	157	1,025
Poliomyelitis					1						1
Scarlet fever	3			9	78	46	9	1	79	4	229
Tuberculosis (all forms)	11		5	5	76	36	16	4	83	46	282
Typhoid and paratyphoid fever					7	1			1	1	10
Undulant fever					1	1					2
Venereal diseases.											
Gonorrhea	11		11	8	68	73	21	14	33	(1)	[1] 239
Syphilis	3		2	10	38	24	10	6	2	(1)	[1] 95
Whooping cough	5		89		162	35	7	4	5	27	334

[1] Report not received for the Province of British Columbia.

FINLAND

Notifiable diseases—December 1949.—During the month of December 1949, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	16	Poliomyelitis	27
Diphtheria	100	Scarlet fever	652
Gonorrhea	547	Syphilis	52
Paratyphoid fever	87	Typhoid fever	22

JAPAN

Influenza.—Information dated February 17, 1950, states that there has been widespread incidence of influenza in Japan in recent weeks. A total of 1,032 cases was reported during the week ended January 28, and 2,125 cases during the week ended February 4.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—Calcutta and Masulipatam.—During the week ended February 4, 1950, 187 cases of cholera, with 63 deaths, were reported in Calcutta, and 17 cases (11 deaths) in Masulipatam.

Pakistan—Dacca.—Seven cases of cholera, with 4 deaths, were reported in Dacca, Pakistan, during the week ended January 21, 1950.

Plague

Belgian Congo—Costermansville Province.—On February 9, 1950, 1 case of plague was reported in Kiavirimu, northeast of Lubero, Costermansville Province, Belgian Congo.

Indochina (French)—Annam—Phanthiet.—During the week ended February 11, 1950, 5 cases of plague were reported in Phanthiet, Annam, French Indochina.

Siam (Thailand).—During the week ended January 28, 1950, 6 cases of plague were reported in Thailand.

Union of South Africa—Orange Free State.—During the week ended January 14, 1950, 1 fatal suspected case of plague was reported at Ramdam Farm in Bethulie District, Orange Free State, Union of South Africa.

Smallpox

Arabia—Jedda and Mecca.—Information dated January 28, 1950, states that to that date 370 cases of smallpox, with 130 deaths, had been reported in Jedda during the recent outbreak in that city. For the week ended February 4, a total of 18 cases (6 deaths) was reported in Jedda, and 11 cases (5 deaths) in Mecca; for the week ended February 11, 15 cases (2 deaths) were reported in Jedda, and 12 cases (4 deaths) in Mecca.

Burma.—During the week ended February 4, 1950, 242 cases of smallpox with 78 deaths were reported in Burma, including 143 cases (49 deaths) in Bassein, and 97 cases (29 deaths) in Rangoon.

China.—Smallpox has been reported in China as follows: Sung Shan, December 21–31, 1949, 34 cases; Swatow, week ended January 28, 1950, 39 cases.

India—Calcutta and Madras.—For the week ended February 4, 1950, Calcutta reported 249 cases of smallpox, with 110 deaths. Madras reported 204 cases (26 deaths) during that week, and 161 cases (21 deaths) during the preceding week (week ended January 28).

Indochina (French)—Viet Nam.—During the week ended February 4, 1950, 64 cases of smallpox, with 52 deaths, were reported in Viet Nam, French Indochina.

Israel—Jerusalem.—During the week ended January 7, 1950, 9 cases of smallpox were reported in Jerusalem, Israel, and 6 cases were reported in that city during the week ended January 14.

Korea—Seoul.—For the week ended January 28, 1950, 10 cases of smallpox, with 3 deaths, were reported in Seoul, Korea.

Nigeria.—During the week ended January 14, 1950, 376 cases of smallpox, with 69 deaths, were reported in Nigeria, including 9 cases in Lagos (1 death), 7 cases in Port Harcourt, 3 cases in Calabar, and 2 cases in Warri.

Typhus Fever

France.—During the week ended February 4, 1950, 1 case of typhus fever (murine type) was reported in Seine Department, France.

Gold Coast—Accra.—During the week ended January 7, 1950, 1 case of typhus fever was reported in Accra, Gold Coast.

Japan—Tokyo-Yokohama.—During the week ended January 28, 1950, 32 cases of typhus fever were reported in the Yokohama-Tokyo Port Area, Japan. The following week (February 4) 52 suspected cases were reported in Tokyo; during the week ended February 11, 68 suspected cases were reported in Tokyo, and 26 (suspected) in Yokohama.

Later information, dated February 23, states that an outbreak of endemic typhus fever is occurring among the civilian populations of Tokyo and Yokohama, confined entirely to vagrants. This outbreak is said to have become explosive in Yokohama during the week ended February 18, with 190 cases, 9 deaths. During the same week 48 cases 3 deaths were reported in Tokyo.

Libya—Cyrenaica—Tokra.—During the week ended January 21, 1950, 2 cases of typhus fever were reported in Tokra, Cyrenaica.

Yellow Fever

French Equatorial Africa—Port Gentil.—On February 9, 1950, 1 suspected case of yellow fever was reported in Port Gentil, Gabon, French Equatorial Africa.

Announcement

A meeting on venereal disease research will be held April 27–28, 1950, in Washington, D. C. The meeting is sponsored jointly by the American Venereal Disease Association and the Experimental Therapeutics Study Section, National Institutes of Health, Public Health Service.

The first day, Thursday, April 27, will be devoted to papers on *Treponema pallidum*, experimental syphilis, early syphilis, other venereal diseases, and the newer antibiotics in syphilis.

The second day will feature the business meeting of the American Venereal Disease Association (limited to members), and papers on neurosyphilis, and miscellaneous aspects of syphilis. The afternoon session on Friday, April 28, will feature a panel discussion on the international aspects of venereal disease control and papers on the treponemal immobilization tests, and the epidemiology and serology of syphilis.

The program for each day will be held in the Thomas Jefferson Auditorium, United States Department of Agriculture, Fourteenth and Independence Avenue SW., beginning at 10 a. m.

All persons interested in this phase of medicine are cordially invited to attend the meeting. Copies of the program will be sent at a later date upon request.

All inquiries should be addressed to: Francis L. Schwehl, Executive Secretary, Experimental Therapeutics Study Section, Division of Research Grants and Fellowships, National Institutes of Health, Bethesda 14, Md., or to Dr. William L. Fleming, Secretary, American Venereal Disease Association, 750 Harrison Avenue, Boston, Mass.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

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PUBLIC HEALTH SERVICE
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Division of Public Health Methods
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Public Health Reports

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Malaria Control in Iran

Résumé of reports made by Dr. Justin M. Andrews and Lawrence B. Hall *

By Miriam Ziony, M. A.**

Iran, formerly called Persia, is a relatively large country with an area of about 628,000 square miles, the equivalent of one-fifth of the area of the United States.

Iran lies between 25° and 40° north latitude and 44° and 64° east longitude. It is bounded on the north by the Russian Caucasus, the Caspian Sea, and Russian Turkestan; on the east, by Afghanistan and Pakistan; on the south, by the Gulf of Oman and the Persian Gulf; on the west, by Iraq and Turkey. From the standpoints of climate and topography, it is comparable to California, New Mexico, Arizona, and Texas. The country varies in elevation from the height of Mount Demavend, 18,600 feet above sea level, to the shores of the Caspian Sea, 85 feet below sea level.

Of the 16 million estimated population, some 11 million reside in about 43 thousand small villages of about 50 families or 250 persons per village. It is in these village populations that most of the malaria occurs. Two-fifths of these villages are located in areas of intense malaria endemicity and another fifth where malaria is present intermittently. The remainder of the population lives in malaria-free areas. The most urgent operational problem is to provide house-spraying services for the 4,400,000 Iranians (880,000 families) living in the highly malarious environments.

Malaria in Iran is considered such an intensified and serious problem that it constitutes a substantial hindrance to the economic development of the country. Its reduction would go a long way toward the achievement of self-sufficiency in agricultural production, and a consequent improvement of the standard of living.

Although malaria is reported in all of the 10 Iranian provinces, it is most prevalent in those bordering the Caspian Sea and in those

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**Social Science Analyst, Division of International Health, Public Health Service.

At the request of the Iranian Government for assistance by a United States malaria control expert, Dr. Justin M. Andrews, was sent by the Public Health Service to Iran in November and December 1948 to make a tour of inspection and to advise on the planning of a national malaria control program for that country. Lawrence B. Hall was in Iran from March to May 1949, to train spraying supervisors and to assist in establishing the malaria control demonstrations suggested in Dr. Andrews' report. This résumé summarizes Dr. Andrews' observations and proposed plans and Mr. Hall's follow-up program on malaria control. Both Dr. Andrews and Mr. Hall were in Iran under supervision of the Division of International Health.

with irrigated river valleys or impounded waters. In the Caspian provinces, malaria mosquitoes breed in natural swamps and in rice fields.

Iran has been called the meeting place of anophelines from the Mediterranean and Indian regions. A considerable number of species has been reported in that country, including *Anopheles superpictus*, *A. sacharovi*, *A. stephense*, *A. maculipennis*, *A. d'thali*, *A. apoci*, *A. sergenti*, and *A. pulcherrimus*. Of these, only the first four are probably of significance with respect to malaria transmission in Iran. In the northern part of the country, the malaria season extends from May to October, cases being most numerous in July. The prevailing type during August and September is *falciparum* malaria. In the southern part, the malaria season starts somewhat earlier and extends a little later.

Few laboratories in Iran examine blood films routinely for presence of malaria parasites. Reported cases of malaria, therefore, are based primarily on clinical observations, confirmed at times by reactions to antimalaria drugs. From 400,000 to 500,000 cases of malaria are estimated to have occurred annually in recent years.

Previous Malaria Control Efforts[1]

In 1944. The United States Army 111th Malaria Control Unit carried on larva control measures around the road camp near Khorramabad. Ministry of Health and Iranian Army personnel were sent for 2-week courses with this unit. They continued the control measures in the Khorramabad area the rest of the malaria season under the supervision of the United States Army.

In 1945. The U. S. Army unit introduced DDT into its malaria program in Iran and left quantities of DDT bombs for the Iranians to use when it departed at the end of that year. Personnel trained at Khorramabad the previous season also undertook larva control measures at Khorramabad, Isfahan, and Shiraz. At Isfahan, the Iranians directed extensive control measures, using up to 1,500 laborers furnished gratis by landowners. At Shiraz, Iranian Army personnel trained at Khorramabad held a training school for other Iranian Army personnel and, working with the Ministry of Health officials, accomplished considerable control. The landowners voluntarily contributed funds for purchase of 500,000 atabrine tablets for free distribution in their villages.

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[1] Information obtained by Dr. Andrews from Dr. Bennett F. Avery, American Adviser to the Minister of Health o fIran.

In 1946. Control measures were continued in the above three areas and were extended to Sanandaj, Kermanshah, and Bushire. At Kermanshah, the Anglo-Iranian Oil Co. cooperated in larva control over a considerable area near its refinery. At Sanandaj, the Iranian Army contributed soldiers and officers. At Bushire, the only breeding areas seemed to be the water storage tanks from which the drinking and washing water of the city was obtained. These tanks were treated with kerosene each week.

In 1947. Control was continued in the areas listed for 1946 and was extended to Khorramashahr, Ahwaz, Palisht area, and Parchin. Because of extensive floods in Khuzistan, there was a minor epidemic of malaria near Ahwaz and a large one in the Khorramashahr-Abadan area. Extensive control measures were carried out, primarily by oiling the collections of stagnant water and by treating malaria cases. As the waters receded, breeding was also found in the irrigation ditches of the palm groves so that these had to be oiled.

The Near East Foundation, in cooperation with the Ministry of Health, began routine larva control in the Palisht group of villages in 1947, but in the main relied on DDT residual spray. About 26 villages received the latter treatment with excellent results.

Parchin was protected by a large-scale larva control project involving the river bed and marshes.

In 1948. The Near East Foundation, with help from the landowners, extended the area of DDT residual spraying.

According to further information obtained through the Near East Foundation's Iranian Area Annual Report for July 1, 1948 to June 30, 1949, the Foundation also undertook a DDT spraying program in the Caspian region as an experiment and as a demonstration. Another spraying program which it completed in 1949, at the request of the Governor General of Baluchistan province, was also highly successful. Malaria mosquitoes and other disease bearing insects were eradicated in 3 cities and 51 villages in Baluchistan; the Ministry of Health supplied all the DDT, the Ministry of War assigned soldiers as laborers, and the Sazeman Shahanshahi, an Iranian health organization, provided all the necessary funds.

Ministry of Health. At present the Ministry of Health is operating a large medical welfare service. Expenditures during the Iranian year 1325 (March 21, 1946 to March 20, 1947) were 177,984,500 rials

($4,312,000) or 2.9 percent of the total government expenditures for that year. According to the Adviser to the Minister of Health, Dr. Bennett T. Avery, nearly 95 percent of the total appropriation for the Ministry is used for maintenance of free medical facilities; only 5 percent is used for preventive medical activities. In and near Tehran, the Ministry of Health operates two tuberculosis sanatoria with about 525 patients, and four hospitals with a total of 700 beds. In the provinces it operates two leprosy sanatoria with about 400 patients, and 83 small hospitals with a bed capacity of 1,988. In addition, there are some 300 dispensaries operated by the Ministry. During the Iranian year 1327 (March 21, 1948 to March 20, 1949) the personnel employed by the Ministry of Health was as follows:

Types of Personnel	*Tehran Area*	*Provinces*
Graduate doctors	193	346
Licensed doctors, dentists, pharmacists, behdars, and midwives	95	357
Pezeshkiars (assistant doctors)	148	441
Vaccinators	40	400
Others	761	1, 740
Total	1, 237	3, 284

Seven Year Plan. A development of the last 2 years may present the opportunity for Dr. Avery to accomplish his objective of increasing the preventive activities in the government's health program. Following World War II, Iran, like numerous other countries with vast increases in expenses of government, found itself without corresponding increases in revenue. The poverty of the people made further taxation out of the question. It was necessary, therefore, to seek means of improving the living standards of the people, to increase exports and to decrease imports.

On December 17, 1946, the Iranian Ambassador to the United States contracted for the Morrison-Knudsen International Co., Inc., to survey Iran's potentialities and facilities and to formulate a program for the development and exploitation of its natural resources, existing industries, and other fields of production.

Concurrently with this study by foreign experts, the government of Iran activated a Supreme Planning Board, under the direction of Dr. Ali Amini, to carry on more extended studies of the social and political economy of the country and to make recommendations for its fiscal improvement.

The report of the Morrison-Knudsen Co. contains a vast amount of information about existing utilities and resources together with suggestions for their expansion and development. The cost of the projects catalogued in this report totals about $1,250,000,000, an amount known to be beyond the present financial competence of the country. Accordingly, two programs were prepared embodying the highest priority projects which could be accomplished by expenditures of $500,000,000 and $250,000,000, respectively.

The public health section of the report, which is additional to projects for water purification and sewage disposal for the seven largest cities in the country, consists of three parts: (a) the prevention of disease; (b) education of medical and public health personnel; and (c) treatment facilities.

The plan involves the construction of 780 health centers, one for each 14,000 inhabitants; a central laboratory and executive headquarters at Tehran; 15 quarantine stations; 10 contagious disease hospitals of 50 beds each; and an institute for training personnel to operate public health centers and hospitals. Together with operational expenses, this would call for about $540,000,000 to be spent within a 7-year period. While the authors of the Morrison-Knudsen report admit the thorough desirability of such an expenditure, it was obviously impossible to include it within the limits set for their recommendations. Therefore, they eliminated the entire treatment program, 390 of the local health centers, all the quarantine stations and the contagious disease hospitals, half of the construction for medical educational facilities, and 40 percent of the operating expenditures. This reduced the public health allotment to $48,294,000, or 9.6 percent, of the $500,000,000 program. In the $250,000,000 program the same public health expenditures were recommended, amounting to 18.6 percent of the total.

On November 10, 1947, Dr. Mosharaf Nafici was invited by the Prime Minister to prepare, with the assistance of the Supreme Planning Board, studies with reference to the report of the Morrison-Knudsen Co., and a program for the economic improvement and development of Iran. His recommendations were made available within a month in a mimeographed document entitled "Preliminary Report on the Persian Seven Year Plan."

The essence of Dr. Nafici's report was later drafted into a document which was submitted to the Majlis, the Iranian Parliament, on May 4, 1948, for consideration. In July 1949, this bill was enacted.

The visit of Dr. Andrews to Iran coincided with that of a group from Overseas Consultants, Inc., a private American concern engaged by the government of Iran to review the allocation of funds and to establish priorities for the more important projects to be activated within the 7-year program. Dr. Andrews accompanied this group on a trip to the Caspian Sea in the northern and northwestern areas of Iran.[2]

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[2] In February 1949, after it had presented a brief preliminary report of its findings and suggestions to the Iranian Government, Overseas Consultants, Inc. (OCI), at the request of Iran made a larger, more comprehensive survey which it later presented in a 5-volume printed report entitled "Report on Seven-Year Development Plan for the Plan Organization of the Imperial Government of Iran." Public health is one of a large number of subjects discussed in the OCI survey.

Of the 21 billion rials ($656,250,000) estimated for expenditures for the Seven-Year Plan for economic development, Dr. Nafici allocated 1.5 billion rials ($46,875,000), or 7.2 percent, to public health. In proposing this expenditure, Dr. Nafici followed the plan for the Revised Seven-Year Health Program submitted by Dr. Avery. This provides a national health institute, 12 quarantine stations, 780 health centers (if three-fifths of the cost of training can be met from special educational funds; if not, only 520 health centers can be built), and special funds for the control of such communicable diseases as smallpox, diphtheria, typhus fever, malaria, trachoma, venereal disease, leprosy, and tuberculosis. Money is also provided for the care of mothers and children, sanitation and water supply, the operation of quarantine stations, and the control of epidemics. Over 208 million rials are allocated for the education of public health personnel, if special health educational funds are available for health training; otherwise, 346 million rials will be used for this purpose.

For malaria control, Dr. Avery proposed the following expenditures per year: first year, 2.9 million rials; second year, 11.4 million; third year, 18.2 million; and, fourth, fifth, sixth, and seventh years, 18.7 million each, or a total of 107,300,000 rials.

Malaria Control Recommendations to the Iranian Government[3]

The following recommendations were made by Dr. Andrews for the development of a national program for the control and prevention of malaria in Iran.

I. *Decentralization of Program and Development in Three Stages*

Dr. Andrews proposed that administrative direction and control, coordination, and technological improvement come from or through Tehran; the actual selection of areas to be treated, the planning and scheduling of operations, the execution of the work, and the appraisal of its benefits should be accomplished at the provincial level.

Malaria control is peculiarly a local health problem, he pointed out, involving essentially the mass relationships of bodies of water in which infesting mosquitoes develop and the houses in which people live. The factors of proximity and accessibility between these two relatively fixed entities in and around the 43,000 villages of Iran should be more familiar to resident health officers in the provinces than to individuals whose responsibilities require them to be stationed in Tehran.

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[3] Abstract of the report made by Dr. Justin M. Andrews, March 1949, on the basis of his malaria control survey in Iran in November and December 1948, at the request of the Iranian Government. Dr. Andrews' recommendations depended primarily on information in available studies on malaria, on routine morbidity reports, and on the opinions of others more closely and extensively associated with the problem in Iran; also, on some observation of spleen enlargement in children and on observation of anopheline mosquitoes in various malarial areas.

Demonstrational Phase. Country-wide malaria control and prevention in Iran cannot be accomplished overnight or in a single season as there is not enough transport, spraying equipment, or insecticide on hand to make more than a beginning where conditions are worst. Extension of activities must depend upon popular persuasion by visual proof that spraying residual insecticide within premises will prevent malaria.

Until the health-educational background essential for popular cooperation has been established and the necessary funds and trained personnel produced to execute a nation-wide program technologically adapted to the specific needs of each different area, Dr. Andrews recommended concentration of the resources at hand primarily on the single method of malaria reduction having the greatest general applicability and effectiveness in Iran. The method proposed is the treatment of the interior surfaces of human habitations and domestic animal shelters with residual insecticides in quantities sufficient to deplete malaria-carrying mosquitoes within homes to the point where transmission diminishes to insignificance or extinction. This practice is expected to reduce Iranian malaria to public health unimportance wherever it is properly applied. It might actually eradicate vectors and malaria in the more isolated villages.

Accordingly, he suggested that the first phase in development of this program be limited to demonstrational applications of DDT in areas where malaria is known to be hyperendemic. This phase was to continue 1 year, mainly at the expense of the national government working through provincial health organizations and with the cooperation of various voluntary agencies interested in public health. More than 50 long tons of 100 percent technical grade DDT and some 400 hand sprayers belonging to the Ministry of Health, and the abundant supply of kerosene available throughout the country were considered sufficient for spraying 42,000 houses twice during the first season. This is estimated to be nearly 5 percent of the country's total village housing in highly malarious areas and should constitute an excellent demonstration of the effectiveness of 5 percent oil-borne DDT.

It was recommended, also, that the demonstrational phase of the program include a single application of water-wettable DDT to as many houses in areas of high malaria endemicity as are being treated with the two applications of oil-borne DDT to compare the residual effectiveness of the two DDT formulations under Iranian conditions. Conclusions were to be based primarily on afternoon counts of anophelines found resting in occupied houses. The services of a malaria biologist were considered valuable in making these determinations.

To make such a comparison, Dr. Andrews suggested, before he left

Tehran, that the Ministry of Health purchase 60 long tons of 50 percent water-wettable DDT and 100 sprayers of the type which can be used for spraying DDT suspensions as well as solutions. This was enough DDT to spray 50,000 houses once.

Dr. Andrews recommended that DDT and sprayers be allocated by the Ministry of Health to the provinces on the basis of their relative malaria incidence. These supplies were to be dispatched to the provincial health officers.

Health officers were to be advised at the same time regarding the nature and objectives of the demonstrational program and to be instructed (1) to store the materials and equipment securely and hold them until trained personnel is available; (2) to choose three pezeshkiars to be ready to proceed to Tehran in the spring for training in the technique of DDT application; and (3) to select several demonstration spray areas, both for oil-borne and water-wettable DDT spraying in their own provinces, where malaria is known to be a major factor of premature death, sickness, and physical nonproductiveness.

One of the three trained pezeshkiars was to be appointed malaria control officer in each province. Together with the other Tehran trainees, he would teach the technique of DDT application to enough appliers so that they would be able to supervise the application of the DDT allotted to each province. Vaccinators were to be used for this work. Equipment was to be unpacked, tested, and used for training practice; spraying was to be under way by the end of April for most of the country. The second application of DDT was recommended for July, following the same order of execution as scheduled for the first treatment with some modifications of this timetable possible around the Persian Gulf and in areas where the summer heat either kills mosquitoes or drives them out of the houses. Wherever there is a bimodal distribution of domestic anopheline density, the DDT in kerosene was to be applied just at the beginning of each house-frequenting cycle.

The size of the spray crews had to be adjusted to each situation, but a group of three sprayers with a foreman-driver was considered the most efficient village unit. Labor for demonstrations would be hired and trained in the village where the work was to be done.

A budget proposed for the demonstrational year of the program was estimated at about 8,000,000 rials for operating costs.

Operational Phase. In principle this is similar to the demonstrational phase except that efforts will have to be made to extend DDT spraying to every village in which malaria is a serious health problem, Dr. Andrews indicated. Cooperative arrangements should be promoted and worked out by the provincial malaria control authorities, with the costs to be divided between the government and the landowners. The foremen, to be selected from the vaccinator component of personnel in the provincial health organizations, should be instructed in spraying techniques during the winter by the provincial malaria-control officers who directed the demonstrational program in 1949. By that time, it was to have been experimentally determined whether or not DDT water suspensions are superior to DDT oil solutions for use in Iran and how many applications are required per year. Program logistics and operations were to be adjusted accordingly.

Malaria is predominantly a rural disease, although it occasionally invades the outskirts of cities. The primary aim of the nation-wide operational phase of the malaria-control program is to reduce, as rapidly and extensively as possible, disabling malaria morbidity in village populations located in hyperendemic and endemic areas. The operational problem in Iran is to provide house-spraying service for the 4,400,000 Iranians (880,000 families) living in highly malarious environments.

It is believed practicable to plan to achieve this maximum coverage over a 3-year period. The demonstrational phase suggested includes the treatment of some 92,000 houses. It is proposed to increase the number of houses sprayed by almost 300 percent each year. For the first 4 years of operation, the cumulative total of houses sprayed would be as follows:

1949	92,000 houses
1950	350,000 houses
1951	620,000 houses
1952	880,000 houses

Budget estimates do not contain the original cost of motor transport necessary to implement completely the nation-wide operational phase of the program, but repair and replacement costs are included. No allowance has been made for local contributions of labor, materials, or funds. According to provisional figures, the maximal recurring total and unit costs for insecticiding homes in the more malarious villages of the country would rank among the phenomenally low health investments in the world for malaria control, as follows:

	Oil-borne DDT[1]	*50% water-wettable DDT*[2]	*90% water-wettable DDT*[2]
	Rials[3]	*Rials*	*Rials*
880,000 houses	86, 064, 000	50, 600, 000	40, 128, 000
50-house village	4, 890. 0	2, 875. 0	2, 280. 0
House	78. 8	57. 5	45. 6
Person protected	19. 7	11. 5	9. 1

[1] Two applications per year.

[2] One application per year.

[3] One rial is equivalent to 3 cents at official rates of exchange.

If it is determined that one application of 50 percent water-wettable DDT per year is the most effective and durable type of application for Iran, according to Dr. Andrews, the annual increase in recurring antimalaria expenditures during the first 4 years of the program at the rate suggested above for augmenting house coverage each year would be approximately as follows:

1949	8,000,000 rials
1950	22,000,000 rials
1951	36,000,000 rials
1952	50,000,000 rials

Additional outlays for trucks and other transportation equipment were estimated at over 3 million rials for each of the first 3 years.

Maintenance Phase. Most of the secondary malaria foci usually disappear spontaneously after the primary expanses of endemicity have been eliminated. Nevertheless, an alert watchfulness for inconspicuous but genuine areas of malaria occurrence must be maintained; these should immediately be investigated and controlled if the existence of transmission is verified. Recognition of malaria-free areas and their maintenance as such requires careful diagnosis and conscientious case reporting by physicians, and vigilant attentiveness by provincial health officers and malaria control officers. If such malaria-free or vector-free areas develop, every effort should be made to extend their borders, at the same time watching to apprehend and nullify reintroduction of parasites or vectors.

If the Seven-Year Plan is activated as proposed, numerous new and additions to old irrigation projects will be established. These are necessary for the development of agriculture in the arid sections of Iran. Irrigation systems, improperly constructed and used, may be prolific sources of anopheline mosquitoes and are probably responsible for much of the malaria in Iran, Dr. Andrews points out. The Malaria Control Unit and provincial malaria control authorities have to take an active part in advising and educating those concerned in the development and operation of these facilities to prevent the enlargement of the country's malaria problem.

The situation to be avoided is that of undertaking domestic insect control on a malaria control budget alone. If it is decided to augment the DDT spraying program to protect against typhus, sandfly fever, leishmaniasis, and possibly trachoma and infections transmitted by flies throughout the country, and to relieve the general population from the nuisance and discomfort of mosquitoes, flies, fleas, lice, etc., an expansion of the operating organization, its activities, and fiscal support will be necessary. It would require from three to four times as much technical personnel, labor, equipment including vehicles, and insecticidal materials. Moreover, fundamental improvements in basic sanitation will also have to be considered.

Adjunctive Malaria Control Measures. Additional measures which can be employed advantageously and be made a part of the general malaria control program are: (1) suppressive antimalarial medication in villages where silkworms are raised and where use of DDT would destroy the silkworms as well as the anophelines; (2) mosquito control in private garden pools or reservoirs through use of insectivorous topminnows that feed on mosquito larvae; and (3) improvement in water impoundment and irrigation methods.

II. *Technical Assistance Through Malaria Control Unit*

An interim Malaria Control Unit, consisting of a malaria control engineer and a malaria biologist, was recommended for the Ministry of Health. If possible, a qualified malaria control operations expert should be hired to conduct the program until Iranian personnel are capable of maintaining it. Plans were to be made, also, for forming and training a permanent Malaria Control Unit of Iranians, consisting of a medical malariologist, a malaria control engineer, and a malaria biologist. Both the interim and permanent Malaria Control Units were to coordinate and give technical guidance to provincial malaria control programs.

Dr. Andrews recommended that, in addition to the 30 pezeshkiars, a limited number of nongovernmental trainees also be trained, if commercial or voluntary organizations using DDT in Iran wished to send some of their employees to Tehran to take advantage of this opportunity.

Instruction was to include (1) the preparation of spraying mixtures of DDT, both kerosene solutions and water suspensions; (2) special indications for use of oil-borne or water-borne DDT; (3) the use, care, maintenance, and repair of sprayers; (4) practice in the application of the correct amounts of spray to different types of surfaces and preparation of houses for spraying; (5) precautions to be taken against causing fires or contaminating food in homes; (6) necessity for spraying behind and under furniture; (7) marking and keeping a record of sprayed houses. Where mosquitoes are most commonly found resting in houses, how they should be caught for identification and how to make simple biological assays of previously sprayed surfaces to determine whether they are still lethal to insects, were to be additional points of instruction in this 1- to 2-week course given by the malaria control engineer.

The malaria biologist was not considered essential in the beginning of the demonstrational phase. He was to be available, however, before the end of the 1949 malaria season to gage entomologically the relative effectiveness and durability of DDT in oil solution and water suspension under Iranian conditions. His observations on these points had to be extensive and critical. Operational improvement of the program in terms of insect destruction would be his most immediate and dominant concern. After the most desirable DDT formulation and schedule of treatment were determined, it was recommended that he devote himself to a study of the speciation, prevalence, and bionomics of the anopheline forms of Iran, with the objective of obtaining further information concerning the more important vectoral forms, their seasonal and geographic distribution, and their breeding, biting, and resting habits, etc. Biological methods of reducing the malariogenic hazard of irrigation projects would have to be explored and tested. The malaria biologist would assist the engineer with the investigation of bona fide complaints of apparent ineffectiveness of DDT, and the provincial health officers in determining the limits of marginal malaria incidence.

The medical officer in charge must be trained in malariology, especially malariometry and malaria control and have administrative, executive, and good public relations abilities. His duties would include: (1) assistance to provincial health and malaria control officers in plotting the relative extent of the malaria problem and in evaluating control operations in their areas; (2) advice regarding modern regimes for suppressive medication and radical cure of malaria; (3) requests for timely estimates of the amounts of insecticide, spraying equipment, transportation, and antimalarial drugs required for the prosecution of the respective programs; (4) active promotion of use of discriminating diagnostic techniques; (5) analyses of records of reported malaria morbidity and mortality and investigation of unusual, irregular, or suspicious events. The medical officer in charge must see that the operational, biological, medical, and epidemiological phases of the program are coordinated to the best possible advantage. He would have to take the lead, also, in stimulating a nation-wide program of community health education on malaria control among the people.

III. *Provincial Malaria Control Organizations*

Dr. Andrews recommended that provincial health officers, malaria control officers (specially trained pezeshkiars), spray crew foremen (specially trained vaccinators), and workers recruited and trained on the job site be activated by the Ministry of Health. These would be responsible for citing, executing, and evaluating the provincial malaria control programs in accordance with specific duties and responsibilities assigned to them.

IV. *Assistance From Other Agencies*

Certain official and voluntary agencies have indicated interest in the proposal to make a systematic and strenuous attack upon malaria in Iran. Some of them have helped in the planning stages; others have expressed a desire to assist in the future.

The problem is not insuperable, says Dr. Andrews. In addition to money, malaria control requires technically trained and experienced supervisors, placed in positions of authority and supported, financially and morally, by the government to operate a nation-wide program according to accepted principles and practices. Iranians must be developed for such responsibilities through training abroad and experience at home under the guidance of competent authorities.

Agencies interested in Iranian malaria control can help in meeting some of the needs and in eliminating some of the deficiencies. Among these groups Dr. Andrews lists: (1) The World Health Organization which has provided technical assistance for malaria control in other countries; (2) the International Health Division of the Rockefeller Foundation which has signified in various ways its sympathetic interest in public health in Iran and in malaria prevention in particular; (3) the Iran Foundation whose prime objectives are the improvement of standards of health and education in Iran and which has already shown its interest by paying the travel expenses of two Public Health Service officers from the United States to and from Iran on malaria missions; (4) the Near East Foundation which is dedicated to increasing the welfare of rural populations in Levantine countries and is noted for its work of rural sanitation and DDT spraying in some of the Iranian villages; and (5) the Anglo-Iranian Oil Co. which has provided very adequate local health facilities, including malaria control, for its employees in Iran.

V. *Suggestions for Legislation on Imports of Antimalaria Drugs*

The Iranian Government has been charging import duty on DDT sprayers, antimalaria drugs, etc., which have been brought into the country by the government to be used or distributed for the public good without charge. This has varied roughly from 15 to 30 percent ad valorem.

Dr. Andrews suggested that consideration be given to legislation to exempt from import charges or to remit to importers, customs duties collected on such antimalarial supplies.

VI. *Conversion to Water-wettable DDT*

Investigations made by Dr. Andrews indicated that importation of DDT in Iran would be much cheaper than manufacturing it there.

DDT may be imported as 100 percent technical grade and as 50 to 90 percent water-wettable. The latter contains from 10 to 50 percent of an inert diluent such as talc, pyrophyllite, etc. If a suitable clay exists in Iran and can be obtained cheaply it might be worth while to import only 100 percent technical grade DDT and to mix it with pulverized clay and the adjuvant sticking and wetting agents after it arrives in Iran. This would eliminate payment of costs and freight for the inactive DDT agent.

A summary of specifications for diluent dusts for use with DDT was sent to the adviser to the Ministry of Health.

Follow-Up Program[4]

In March 1949, Lawrence B. Hall went to Iran to establish the demonstrational phase of the program as recommended by Dr. Andrews.

To assist in the malaria control training program, the Public Health Service publication "DDT Residual Spray Operations," revised to make it applicable to the Iranian situation, was translated by members of the staff of the Ministry of Health and mimeographed for distribution to the training classes and to subsequent students.

The first class of malaria control trainees, with 26 representatives from eight provinces (ostans), convened in Tehran April 4, 1949. A number were unable to report on time due to delay caused by snow-blocked mountain passes. By April 18, 31 civilians and 10 officers of the Iranian Army had arrived. The class was extended for students who reported late.

Field demonstrations and practice in spraying the inhabited dwellings of several villages in the Tehran area were included in the course given by Mr. Hall to a total of 47 trainees. These trainees quickly grasped the basic information and, after a very short field experience, were able not only to apply the residual spray themselves but to supervise crews of fellow students in the spraying of relatively large areas.

After termination of the program, the trainees returned to their original stations, in some cases driving trucks containing necessary supplies. Under direction of the health officers in their own areas, they had to assemble crews consisting of other pezeshkiars whom they had to train during the season's operations. By the end of the 1949 malaria season it was expected that there would be 150 to 200 capable spray crew foremen prepared for next season's operations.

Prior to the arrival of Mr. Hall, only limited progress had been made in distribution of sprayers, DDT, and miscellaneous equipment and materials to the field and in selection of operational areas by the provincial health officers. Considerable time was therefore spent in planning for operations and in setting up the necessary machinery within the Ministry of Health. A committee composed of members of the Ministry's staff selected areas of Iran in which the malaria control program was to be put into effect and arranged for the distribution of supplies and equipment.

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[4] From Preliminary Report on Malaria Control Follow-Up Training Program and Summary of Recommendations to the Iranian Government, by Lawrence B. Hall, sanitary engineer, on detail to the Division of International Health, Public Health Service; and consultant to Iran, March-May 1949.

Numerous problems were encountered in the use of DDT in kerosene, particularly the problem of transporting the oil from the main roads to the habitations at a distance from vehicular roadways. For this and other reasons, the use of water-wettable DDT in Iran, when available, appears desirable and its use was urged in succeeding seasons provided that it could be demonstrated that under Iranian conditions the water-wettable DDT was no less lethal to the malaria vector than the oil-borne DDT. To determine the answer to this important question during the current season, the Ministry of Health, assisted by the American Embassy, initiated a request to the United States Department of State for the assignment of a trained entomologist.[5] If the entomologist reached Tehran on or about July 1, at least a rough evaluation of the relative merits of the two systems might be completed during the current season.

Sixty tons of water-wettable DDT and 100 special Lofstrand sprayers were reported to be in a port on the Persian Gulf, but had not reached Tehran at the time of Mr. Hall's departure. Preparations were under way, however, to initiate use of water-wettable DDT on a number of projects as soon as possible. It was recommended to the Ministry of Health that sufficient sprayers and water-wettable DDT be supplied to spray 35 Varamine Plain villages, containing 7,000 inhabitants under direction of the Near East Foundation. After completion of this short-time project, the equipment used was to be diverted to other areas. It was also planned that water-wettable DDT with an appropriate number of sprayers be used to spray a maximum number of houses in the Caspian littoral.

Cooperation of Other Agencies

Two representatives of the World Health Organization were making a survey of the country, at the time of Mr. Hall's arrival, to serve as a basis for a report to WHO on the advisability of sending malaria control personnel to Iran during the 1950 malaria season. They stated they would recommend a WHO malaria control demonstration in a selected area. The secretary of the WHO Expert Committee, seen later in Geneva by Mr. Hall, agreed to recommend to the Expert Committee that the WHO provide an entomologist and a director of malaria control operations to assist the Iranian nation-wide program during the 1950 season rather than attempt a small scale demonstration.

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[5] Richard Dow, Senior Assistant Scientist, Public Health Service, Communicable Disease Center, Atlanta, Ga., was sent to Iran in August 1949 to make a 3-month survey of the relative effectiveness of water-wettable and oil-borne DDT in Iran. His report is not yet available.

The Rockefeller Foundation representative in Tehran offered considerable assistance in the training activities and in establishment of the operating program.

The Near East Foundation undertook, at the request of the Ministry of Health, to spray the habitations in the vicinity of Zabol in Ostan VIII, near the Afghanistan border, as well as other areas already indicated. This was a successful operation and a definite accomplishment. Using DDT and equipment supplied by the Ministry of Health, the Near East Foundation has done a considerable amount of residual DDT spraying. This Foundation, however, cannot be expected to expand its malaria control program to the exclusion of its other interests, Mr. Hall stated.

Personnel of Overseas Consultants, Inc., also cooperated extensively with the Ministry of Health in planning the malaria control program.

Summary of Recommendations to the Iranian Government

The following recommendations were made by Mr. Hall:

Organization. Operations should be decentralized under the provincial health officer. These provincial organizations must be assisted by a Malaria Control Unit which would report administratively to the Ministry of Health and would have its own personnel, appropriation, budget, vehicles, office, and warehouse facilities. The purpose of the Malaria Control Unit would be to assist the provincial officials; to procure necessary equipment, materials, and vehicles; to procure and train personnel.

Training. Training should be given at four levels, as follows:

1. Malaria Control Unit technical personnel trained under fellowships either in Italy or the United States for a minimum of 3 months.
2. Malaria control supervisors, in addition to any foreign training, and provincial personnel to be trained under the Near East Foundation through its facilities in Iran.
3. Crew foremen trained in classes given each spring before the malaria season begins. These classes should be conducted by the staff of the Malaria Control Unit and the provincial malaria control supervisors.
4. Crew members trained by crew foremen on the job as is necessary.

Equipment and Materials. Vehicles must be obtained and assigned permanently to malaria control operations. They should be available at the beginning of the season and remain assigned to this duty throughout the operating season without interruption. Animals must be made available for transportation over difficult terrain. The best sprayers procurable and adequate stores of spare parts should be obtained in sufficient quantity to serve the needs of the program.

Nozzles used should be specially designed for the purpose, having a flat spray at approximately an 80° angle. The majority of spraying operations during the next season should be conducted with 50 percent water-wettable DDT. Small scale field trials, utilizing 90 percent water-wettable DDT were recommended. The use of DDT in oil should not be encouraged unless special circumstances require its use and transportation to the area under consideration is not a problem.

Operations. DDT spraying operations should be carried out only during the period immediately prior to the beginning of the malaria season. Spraying should not be done during the winter months. Protection of nomadic tribesmen and roof-top sleepers should receive special attention. The problem of the utilization of DDT in silkworm raising areas will have to be investigated by carefully conducted field trials if therapeutic measures do not prove entirely effective or are undesirable.

Adjunctive Measures. The use of DDT and other insecticides by individuals as well as by those responsible for the malaria control program should be encouraged by all means possible. These should include duty free importation of the insecticides not produced in Iran and the distribution of insecticides to the public at cost by the government.

Field Test of the Efficiency of the Rodenticide Compound W.A.R.F. 42

By MARTIN W. SCHEIN*

Laboratory studies of Compound W.A.R.F. 42 (*1*) indicate that while this anticoagulant is relatively harmless to handle and use, it is an extremely effective rodenticide if sufficient time is allowed for cumulative action. These tests also indicate that a period of 4–6 days at a concentration of 1 mg./gm. of bait will give a good kill. The results of testing Compound W.A.R.F. 42 under natural conditions in residential city blocks are reported here.[1]

This report does not constitute an endorsement of the technique of employing poisons in rodent control, for it has been demonstrated (*2*) that the effects of poisoning are, at best, short lived. On the other hand, environmental changes, such as reduction in the harborage or food supply, would give more profound and more permanent control, and is therefore to be preferred. However, poisoning has a definite value under a few specified conditions.

Methods

A total of 13 blocks was selected, 6 for poisoning and 7 for reference. The blocks were typical residential slum areas, consisting of two rows of houses separated in the rear by an alleyway traversing the length of the block. The rear yards were invariably surrounded by wooden or wire fences in various states of disrepair. Outdoor toilets were present in about 15 percent of the yards.

Rodent populations were estimated (*3*) for all the blocks and the boundaries of the individual colonies within the blocks were mapped (*4*). After determining the limits of the colonies, bait containing Compound W.A.R.F. 42 was set out in open cigar boxes in the blocks to be poisoned. Usually one box per colony was set out, but in a few heavily populated colonies two boxes were used. The bait was a simple mixture of Compound W.A.R.F. 42 and finely-ground corn at a poison concentration of 1 mg./gm., mixed by hand.

One block, F, was prebaited with ground corn primarily to develop the technique of baiting and secondarily to see if there would be any appreciable difference in bait consumption or kill. There was plenty of other food available for the rats at all times, as every effort was made to keep the environment unchanged. In some instances, removal of old wooden fences and outdoor toilets was postponed until after the tests were completed.

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*Rodent Ecology Project, Department of Parasitology, School of Hygiene and Public Health, Johns Hopkins University. The work reported was conducted under a grant from the National Institutes of Health, Public Health Service.

[1] We are indebted to the Denver Laboratory of the Fish and Wildlife Service for supplying the Compound W.A.R.F. 42, and to Drs. Karl P. Link and C. A. Krieger for advice on the laboratory results.

A measured amount of poisoned bait was set out in each box and weighed at 1- or 2-day intervals to determine consumption. The dry bait invariably gained from 2 to 8 percent in weight due to the absorption of moisture on the first day of exposure, and gained or lost varying amounts on succeeding days, depending upon the relative humidity of the day. Since many bait boxes showed a decided gain in weight on high humidity days, a moisture factor of 3 to 5 percent was subtracted from all the weights for that day; the result was a fairly accurate rate of consumption for each station. The daily totals of all the stations in each block were combined to give the rate of consumption on a block basis.

After the poison operation was completed, an attempt was made to obliterate all rat signs on the blocks in preparation for the final estimate. The final survey was generally made within 2 days after the removal of the poison except in the case of block F, where 6 days elapsed. It was felt that normal population recovery would be negligible for such a short duration of time, and therefore the final estimates would not be significantly affected.

Results

The results of the poisoning are given in the table and chart. All blocks showed a decided reduction in population, which averaged 84.5 percent (weighted) per block; construction work in one yard in block E could account for only a very small amount of the mortality. In contrast, the seven reference blocks, which had been surveyed at 2-month intervals for the past 11 months, showed no unexplainable changes in population (see table). The decline in block M was clearly due to major construction work in 5 yards.

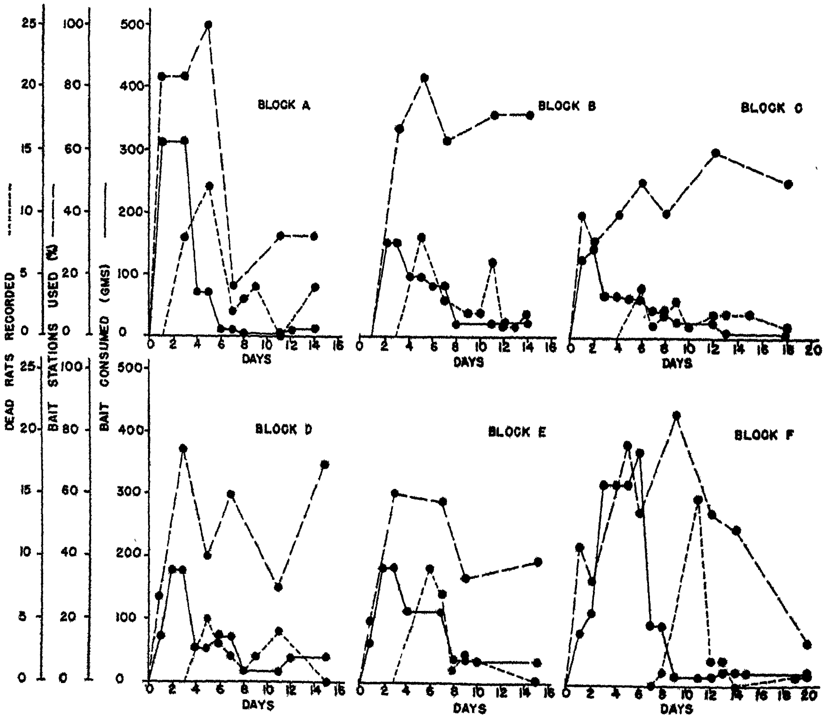
The consumption of poisoned bait showed some noteworthy features. Out of a total of 62 bait stations, 5 were never used, and 19 more were not used until after the third day; all other stations were in use on the first or second day. Delay in use is attributed to the fact that all boxes were placed under either a makeshift or a permanent cover designed to keep out pets, children, and rain. In many instances this necessitated setting the bait a few feet from the runway. Of the 5 completely undisturbed boxes, 3 were in positions that were completely missed by existing rat colonies, and 2 were placed in areas which were subsequently discovered to be no longer inhabited by rats. The percentage of bait stations used per day per block, as shown in the chart, corresponds usually with the amount of bait taken until the second or third day. After that, the curve representing

Comparative data before and after poison

Block	Dwelling units (*5*)	Bait stations	Population before poison		Days of poison	Population after poison		Per-cent reduction	Total grams of bait consumed per dead rat
			Date	Rats		Date	Rats		
A	34	6	Aug. 22	50	14	Sept. 9	0	100.0	23.1
B	57	8	do	100	14	do	19	81.0	10.0
C	78	10	do	75	18	Sept. 12	5	93.3	11.5
D	60	11	Aug. 23	130	15	Sept. 10	10	92.3	7.6
E	117	16	Aug. 17	174	15	Sept. 15	54	69.0	9.8
F	73	9	Aug. 20	92	[1] 20	Sept. 20	4	95.6	11.5
G	66	--------	July 9	105	--------	Sept. 9	110	Gain	--------
H	49	--------	do	41	--------	do	55	Gain	--------
I	50	--------	July 7	33	--------	do	32	3.0	--------
J	47	--------	July 5	28	--------	Sept. 10	55	Gain	--------
K	57	--------	do	43	--------	do	48	Gain	--------
L	63	--------	July 8	40	--------	Sept. 9	42	Gain	--------
M	74	--------	do	53	--------	do	31	41.5	--------

[1] Includes 5 days pre-baited.

consumption dropped sharply while the number of bait stations in use remained fairly static. This would indicate an abrupt loss in consumption on the part of the rats after the second or third day of poisoning, for the prebaited block F showed a normal consumption for the nonpoisoned period (5 days) and then a sharp drop 2 days



Curves for bait consumption, percentage of bait stations used, and recovery of dead rats in each of the 6 treated blocks.

after the poison was introduced. In addition, the figures (table) show that a surprisingly small amount of bait was sufficient to result in the high mortality obtained.

The collection and observation of dead rats provided additional data concerning the results of poisoning. Each of the carcasses seen by the observer was noted as to date found, weight, sex, and location. Furthermore, reports were solicited from the inhabitants when available. In these cases, only the date found, location, and relative size could be noted. It is believed that there is very little overlapping between the dead rats actually seen by the observer and the secondhand reports, for the inhabitants disposed of the carcasses immediately upon discovery. It must be emphasized that only about 20 percent of the inhabitants were questioned, and that many rats were disposed of without any report at all. Therefore, the figures on dead rats seen and reported per day per block, as shown in the chart, are only relative and are by no means total counts. The graphs show the greatest mortality generally between the fifth and sixth day after poisoning, and a gradual decline thereafter with many fluctuations. The data show no differential kill as regards age and sex ratios of recovered rats.

The question arises as to why block E gave such a low percentage of kill as compared to the others. A partial answer to this lies in the relative inaccessability and size of the colonies. In some instances, what was originally plotted as one large colony with one bait station, turned out instead to be two fairly distinct colonies, one of which therefore had no access to the bait station. Such conditions lead to the suggestion that in an exceedingly high population such as this block, either a longer or a more intensive poison period is required for a substantial kill.

The pre-baited block F showed no appreciable difference in data from the other blocks except for a decided increase in bait consumption before poisoning. From the data presented here, there seems to be no need or justification for prebaiting with Compound W.A.R.F. 42 except as far as determining an acceptable bait is concerned.

The changes in numbers of rats in these blocks 3 months after the final post-poison survey may be of interest to indicate the rate of population increase after a sharp reduction. The December survey results were: block A, 4 rats; block B, 70 rats; block C, 16 rats; block D, 35 rats; block E, 43 rats; block F, 5 rats. The average (weighted) gain per block for these 3 months was 88.0 percent. In contrast, estimates of the 7 untreated blocks indicated an average (weighted) loss of 12.4 percent per block which is within the experimental error of measurement (*3*) and therefore should be interpreted as no change in population.

Summary

The object of this experiment was to test the efficiency of the anticoagulant, Compound W.A.R.F. 42, under natural field conditions.

The populations and the boundaries of colonies of rats in 13 blocks were determined. Poison was exposed in 6 blocks; 7 were left for reference. Compound W.A.R.F. 42 was mixed with ground corn, 1 mg/gm. of bait; one cigar box of bait was set out per colony and allowed to remain 14 to 18 days. The consumption was measured at 1- to 2-day intervals.

Populations were again determined after the poisoning period, and kills of 69–100 percent were recorded, with the weighted average kill of 84.5 percent. On the other hand, the populations of the reference blocks showed no unexplainable changes.

Dead rats were recovered in large numbers generally after the fourth and fifth day of poison. However, bait consumption showed a rapid decline after the second or third day of poison, and a relatively low level of consumption thereafter with slight fluctuations.

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Principles on the Education and Utilization of Sanitary Engineers*

On January 15–16, 1950, under the sponsorship of the Division of Engineering Resources of the Public Health Service, a group of 36 persons, including 9 from the Service, met in Washington to discuss, on a broad basis, the education and utilization of sanitary engineers. This group was representative of both the "producers" and the "consumers" of young men educated in sanitary engineering. The views of those connected with universities and colleges, Federal agencies,

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*Report from the Division of Engineering Resources, Bureau of State Services, Public Health Service.

State and local health departments, and industry were all heard and general agreement among those present was reached on the following principles:

1. Future programs of study at the university level that are to be pursued in preparation for the practice of sanitary engineering should encompass a minimum of 5 years of study of mathematics, the basic sciences, and the engineering disciplines. This can be accomplished through 4 years of study leading to a bachelor's degree in engineering followed by 1 year of study leading to a master's degree in sanitary engineering, this additional year to include sanitary engineering subjects and adequate instruction in the principles of public health. It is desirable that this be a program of continuous study.
2. Programs of study at the university level that are pursued in preparation for sanitation practice should include instruction in mathematics and the basic sciences adequate to form the foundation for later study in the sciences, the engineering disciplines, or the medical disciplines by those individuals who are qualified to benefit by graduate study.
3. Field training programs can be a supplement but never a substitute for rigorous academic education.
4. No substitution can be made for the skills that the qualified sanitary engineer brings to his work. However, it is realized that within the field of environmental sanitation a wide variety of skills is essential and that trained personnel other than sanitary engineers may possess some of these skills and may apply them successfully in specialized areas.
5. The procurement of young men for the sanitary engineering profession rests on the intellectual and financial attractions of the job. Means should be developed for the advancement of sanitary engineers in their profession and for the lifting of sanitary engineering salaries to higher levels.
6. There is evidence that increased opportunities in public health beyond the technical sanitary engineering field are available to qualified and capable sanitary engineers.
7. It is desirable that the Public Health Service make studies of (a) the need for sanitary engineering personnel in all areas of work where engineering disciplines may contribute to the promotion of health, which study should be sufficiently broad to include both current and future needs, and (b) the rate of loss from the sanitary engineering field, after graduation, of those receiving academic training in sanitary engineering.
8. The principle is reaffirmed that the planning and direction of local environmental sanitation programs should be by competent sanitary engineers and that organization and employment to that end should be advocated and promoted by all public health agencies.

Recovery of *Brucella melitensis* from the Hog

By S. R. Damon, Ph. D., and J. H. Scruggs, D. V. M.*

Isolation of *Brucella melitensis* from cow's milk in Indiana has been reported by Damon and Fagan previously (*1*). Recovery of this organism from hogs in Iowa has been recorded by Jordan and Borts (*2*), and in Minnesota by Kabler and MacLanahan (*3*) and by Kabler, Bauer, and Nelson (*4*). Its isolation from the hog in Indiana is recorded here for the first time.

In this laboratory it is routine procedure to culture the clots from blood specimens submitted by physicians for agglutination tests; and, from a patient (W. D.), *Br. melitensis* was recovered from such a clot. Epidemiological investigation of the case brought out the facts that the patient had already been diagnosed clinically as having brucellosis and that as a farmer he had frequent contact with both cattle and hogs. Accordingly, blood specimens for agglutination tests were obtained from the 2 dairy cows and 18 breeding swine on the premises, with the result that 1 cow and 8 of the sows reacted to some degree with a *Brucella* antigen.

Cultures in crystal violet tryptose broth were made from the blood clots of all the above specimens, and after incubation in a CO_2 atmosphere for a week, crystal violet tryptose agar plates were streaked from the broths. On the plates made from one of the swine specimens, colonies came up which were serologically identified as *Brucella*. Further study of this culture demonstrated that in its H_2S production and dye inhibition it corresponded to *Br. melitensis*. So far as can be determined, this is the first time *Br. melitensis* has been shown to be present in the hog in Indiana. This observation serves to extend our knowledge of the animal distribution of *Br. melitensis* and to throw further light on a possible source of human infection in this area.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED FEB. 25, 1950

For the current week in the Nation, reported cases of influenza decreased from 16,223 to 14,556 from the preceding week or 10 percent. For the corresponding week last year, 4,542 cases were reported. The 5-year (1945–49) median for the week is 5,192. The cumulative total for the United States is 64,196 for the calendar year as compared with the corresponding cumulative total of 36,750 for 1949 and 155,013 for 1946.

The West North Central Division decreased from 227 cases last last week to 108 currently, and the West South Central Division decreased from 11,703 to 9,390. Increases over the previous week are noted in the South Atlantic (from 3,005 to 3,469), East North Central (from 36 to 74), East South Central (from 416 to 478), Mountain (from 813 to 981), and Pacific (from 18 to 44). The two remaining divisions showed slight increases.

Texas reported incidence of influenza for the current week was 22 percent below the previous week (from 10,980 to 8,549). For the corresponding week of 1949, 2,172 cases were reported. The 5-year (1945–49) median for Texas for the week is 2,465. Of the States reporting cases in excess of the 5-year (1945–49) median for the week, the 5 highest (excluding Texas and Virginia) were Colorado, 266; Georgia, 209; Oklahoma, 543; Montana, 383; and West Virginia, 770.

Reported incidence of measles (8,172) for the current week, although increasing over last week, remained below the 24,133 cases for the corresponding week last year and the 5-year median of 15,725. Michigan reported 2,148 cases of measles as compared with 1,240 last week and a 5-year corresponding median of 462. Other States reporting measles above the 5-year median for the week are Arizona, Iowa, Kansas, Mississippi, and Utah.

Reported cases of whooping cough decreased from 2,701 last week to 2,447 currently but remained above the 5-year median of 2,251. The cumulative total of 19,498 was above the corresponding 5-year median of 17,994. Michigan reported the largest number of cases with 313. Other States reporting above median incidence for the week were Missouri, 33; West Virginia, 55; and Wisconsin, 142.

Three cases of smallpox were reported, 1 in South Dakota and 2 in Wyoming.

Telegraphic case reports from State health officers for the week ended Feb. 25, 1950

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine			3	36		12	1		6				14	
New Hampshire			1			2			3					
Vermont				35		1			6				21	
Massachusetts	4	2		165	1				126			1	103	
Rhode Island	1			11		2			9			1	28	
Connecticut			1	41	2	42			34				92	
MIDDLE ATLANTIC														
New York	3	1	[2] 5	561	4	254	11		[3] 144			1	200	17
New Jersey	3		2	494	2	57	3					2	129	
Pennsylvania	4			292	9	52	4		132			4	223	2
EAST NORTH CENTRAL														
Ohio	4		5	198	10	93	3		287			1	212	13
Indiana	10	2	25	238		11			57				49	11
Illinois	1		12	178	4	109	2		101		1		89	4
Michigan		2		2,148	4	59	5		169			1	313	3
Wisconsin			32	306	6	15			101			1	142	
WEST NORTH CENTRAL														
Minnesota	4			57	1	19	9		30				19	
Iowa		1		786		4			11				2	6
Missouri	3		2	11	1	10			30				33	
North Dakota	1	1	46	5		9			8				1	
South Dakota	1			49		2			3	1				
Nebraska			5	59		5			13				8	
Kansas	1		55	86	1	22			40				9	2
SOUTH ATLANTIC														
Delaware				46	1		1		9				9	
Maryland	4		8	41	1	72			31				40	
District of Columbia			4	92	2	17			2				1	
Virginia	1		2,377	61	3	126	1		32		3		51	2
West Virginia	3		770	162	3	16			18			4	55	9
North Carolina	6			148	3		2		31		1		30	
South Carolina	4		93	100		9			5			2	4	5
Georgia	11		209	46	1	23	1		13		4	3	21	8
Florida	1		8	33		11	5		4				3	1

EAST SOUTH CENTRAL														
Kentucky	2		27	45	2	32			22			2	12	11
Tennessee	5		123	85	3				43			1	30	6
Alabama	10		295	54	2	112	2		13		1	4	13	11
Mississippi	8	1	33	112	2	40	8		11		2			7
WEST SOUTH CENTRAL														
Arkansas	3		297	9	2	83			9		3	1	36	3
Louisiana	7		1	73		38	4		1		2	11	1	
Oklahoma	3	1	543	3	1	75	1		18		1	1	9	5
Texas	24	1	8,549	323	4	884	12		44			3	189	32
MOUNTAIN														
Montana			383	45	1		1		9					
Idaho			68	85		2	2		7				1	
Wyoming	1		28	24		1			3	2			3	
Colorado	2	2	226	143		36			14			1	7	8
New Mexico	2			22		13	2		10		2		2	
Arizona	1		258	142	1	22			9			1	51	
Utah			18	238					4				21	
Nevada						1								
PACIFIC														
Washington			12	43		1	1		37				60	
Oregon	5		11	23		21			23				27	
California	7	2	21	218	8	42	16		130				84	2
Total	150	16	14,556	8,172	85	2,457	97		1,862	3	20	46	2,447	168
Median, 1945–49	261	7	5,192	15,725	101		38	1	3,116	3	21	40	2,251	
Year to date, 8 weeks	[4] 1,346	89	64,196	45,001	696	18,659	898	6	13,838	12	188	[4] 363	19,498	1,137
Median, 1945–49	2,443	59	36,750	69,199	709		353	4	22,009	30	189	333	17,994	
Seasonal low week ends	(27th) July 9		(30th) July 30	(35th) Sept. 3	(37th) Sept. 17		(11th) Mar. 19		(32d) Aug. 13	(35th) Sept. 3		(11th) Mar. 19	(39th) Oct. 1	
Since seasonal low week	[4] 5,617		94,726	64,131	1,609		43,380		30,277	19		[4] 3,736	38.587	
Median, 1944–45 to 1948–49	10,009		73,020	95.323	1,639		19,323		47,391	84		3,861	40,470	

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[1] Including cases reported as salmonella.

[2] New York City only.

[3] Including cases reported as streptococcal sore throat.

[4] Deductions, week ended February 18: Diphtheria, Georgia 3 cases; typhoid fever, Arkansas 1 case.

Alaska: Measles 42.

Hawaii: Diphtheria 2, influenza 3, whooping cough 1.

PLAGUE INFECTION IN NYE COUNTY, NEVADA, AND LEA COUNTY, NEW MEXICO

Nevada

Under date of February 21, plague infection was proved in 46 fleas, *Thrassis gladiolis*, taken from a ground squirrel, *Citellus lateralis*, found dead January 24, 1950, 15 miles north of Pahrump, then 3 miles east on Mile Road in Nye County.

New Mexico

Under date of February 21, plague infection was proved in Lea County, south of Maljamar, in the same general area where a resident of this town shot rabbits on January 6, 1950, and 3 days later developed bubonic plague. The specimens were as follows: Ten fleas, *Thrassis fotus*, taken from 5 grasshopper mice, *Onychomys leucogaster*, trapped February 8, 1950, on U. S. Highway 83 at Maljamar; a tissue from one cottontail rabbit, *Sylvilagus auduboni*, found dead 1 mile south of Maljamar, February 9, 1950, and 7 fleas, *Hoplopsyllus affinis*, taken from the dead rabbit; tissue from 2 wood rats, *Neotoma albigula* (both positive), found dead 2 miles south of Maljamar, February 9, 1950; thirty-five fleas, 12 *Echidnophaga gallinacea* and 23 *Orchopeas sexdentatus* obtained from 2 wood rats' nests located 2 miles south, then eight-tenths mile west of Maljamar; a tissue from one cottontail rabbit, *Sylvilagus auduboni*, found dead February 10, 1950, on Black Top Road, 1.7 miles south of Maljamar, and 13 fleas, 11 *Hoplopsyllus affinis* and 2 *Echidnophaga gallinacea*, taken from the dead rabbit; nineteen fleas, *Orchopeas sexdentatus*, collected from a wood rat, *Neotoma*, nest found 3 miles south of Maljamar, February 11, 1950; and nine fleas taken from 2 wood rats, *Neotoma albigula*, trapped February 11, 1950, 2 miles south of Maljamar and then eight-tenths mile west of a Maljamar dump.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (in fleas).—Under date of February 20, 1950, plague infection was reported proved on January 24, in a mass inoculation of 19 fleas taken from rats trapped in District 7A, Honokaa, Hamakua District, Island of Hawaii, T. H.

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended February 4, 1950.—During the week ended February 4, 1950, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	1		55		315	352	46	43	53	120	985
Diphtheria				1	6	2					9
Dysentery, bacillary					2	2				1	5
German measles			28		8	212		36	285	74	643
Influenza			66			3	1			11	81
Measles			10		423	533	86	134	71	166	1,423
Meningitis, meningococcal							1		1		2
Mumps			103		194	734	9	48	111	368	1,567
Poliomyelitis			2		20		2		1		25
Scarlet fever	1				71	54	20	1	63	16	226
Tuberculosis (all forms)	34		3	17	114	79	8	11	1	25	292
Typhoid and paratyphoid fever				1	12						13
Undulant fever						1					1
Venereal diseases:											
Gonorrhea	9		10	11	102	55	31	7	40	66	331
Syphilis	4		5	8	87	42	4	6	4	11	171
Whooping cough	1		9		139	125	1	14	7	16	312

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India.—During the week ended February 11, 1950, cholera was reported in certain cities in India as follows: Calcutta, 177 cases, 62 deaths; Masulipatam, 17 cases, 3 deaths; Tellicherry, 10 cases, 2 deaths. For the week ended February 18, 110 cases were reported in Calcutta.

Plague

China.—Kwangtung Province.—According to information dated

February 13, 1950, an outbreak of plague had been reported in Southwest Kwangtung Province, China. Later information, dated February 23, states that the exact location of this outbreak was in the coastal town of Anpu, and that no spread of the disease was reported after February 5. No figures on the number of cases occurring were given.

Smallpox

Arabia.—Jedda and Mecca.—Information from Jedda, Arabia, dated February 20, 1950, states that the epidemic of smallpox which has been occurring in that locality was regarded as of that date as being in its closing stages. During the week ended February 18, 8 new cases with 3 deaths were reported in Jedda, and 17 cases, 8 deaths in Mecca.

Burma.—During the week ended February 11, 1950, 330 cases of smallpox, with 100 deaths, were reported in Burma, including 179 cases, 43 deaths in Bassein, and 109 cases, 49 deaths in Rangoon. For the week ended February 18, Bassein reported 147 cases, Rangoon 104 cases.

China.—Eight cases of smallpox were reported in Shanghai during the week ended February 11, 1950. During the period February 1–10, 60 cases were reported in Swatow.

French West Africa.—During the period January 21–31, 1950, 79 cases of smallpox were reported in Niger Territory, and 86 cases were reported in Dahomey during the period February 1–10.

India.—Smallpox has been reported in Calcutta and Madras, India, as follows: Week ended February 11, 1950, Calcutta 224 cases, Madras 227 cases; week ended February 18, Calcutta 217 cases, Madras 249 cases.

Indochina (French).—During the week ended February 11, 1950, 13 cases of smallpox were reported in Rachgia, Cochinchina.

Typhus Fever

Colombia.—During the month of December 1949, 200 cases of typhus fever were reported in Colombia.

Yellow Fever

Panama.—On January 23, 1950, 1 fatal case of yellow fever was reported in Panama. This case was stated to have been contracted in a jungle area near Palmas Bellas. Death occurred in a hospital in the city of Colon.

YELLOW FEVER INOCULATION REQUIREMENTS FOR AIR TRAVELERS TO PAKISTAN

On January 30, 1950, the Embassy of Pakistan in Washington, D. C., informed the Secretary of State that the Government of Pakistan has imposed quarantine restrictions against yellow fever on all aircraft arriving in Pakistan from the West, regardless of whether or not they have been in a yellow fever area. Therefore, in order to avoid the possibility of quarantine detention, it is desirable for all air travelers to Pakistan to possess a valid Yellow Fever Inoculation Certificate.

DEATHS DURING WEEK ENDED FEB. 25, 1950

	Week ended Feb. 25, 1950	Corresponding week, 1949
Data for 94 large cities of the United States:		
Total deaths	9, 563	9, 419
Median for 3 prior years	9, 811	
Total deaths, first 8 weeks of year	77, 034	79, 247
Deaths under 1 year of age	598	649
Median for 3 prior years	649	
Deaths under 1 year of age, first 8 weeks of year	5, 006	5, 409
Data from industrial insurance companies:		
Policies in force	69, 870, 523	70, 595, 642
Number of death claims	10, 977	10, 489
Death claims per 1,000 policies in force, annual rate	8. 2	7. 7
Death claims per 1,000 policies, first 8 weeks of year, annual rate	9. 6	9. 6

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, Public Health Service, Washington 25, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington 25, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

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Siberian Tick Typhus

Relation of the Russian Strains to *Rickettsia prowazeki*

By T. T. CROCKER, B. L. BENNETT, E. B. JACKSON, M. J. SNYDER, J. E. SMADEL, R. L. GAULD, and M. K. GORDON*

Siberian tick typhus (synonyms: tick-borne typhus, Far East typhus) has been recognized during the past 10 years as a disease entity caused by a rickettsia. Cases of this disease have been reported from Central Asia; Central Siberia (Krasnoyarsk area); and the Maritime Provinces (Khabarovsk area) of the Far East. It is an acute febrile illness which occurs in the spring and summer months, its incidence being closely related to the number and activity of ticks (*1*). East of Lake Baikal the vectors are believed to be *Haemaphysalis concinna* and *Dermacentor silvarum* (*2*, *3*, *4*, *5*), while in Central Asia and Western Siberia the vector is said to be *Dermacentor nuttali* (*1*, *3*, *5*, *6*, *7*). It has been shown that the rickettsiae which are considered to be the etiological agents can be passed transovarially by these three species of ticks. The infection has also been transmitted to laboratory animals by the nymphs and larvae as well as by the adult ticks (*2*, *5*, *6*). Although these ticks parasitize a wide range of lower animal hosts, including rodents, birds, deer, horses, and cattle (*4*, *5*), the actual reservoir of the rickettsia is not known. Savitskaia (*11*) has reported an isolation from the suslik, a type of ground squirrel.

Newer methods of antigenic analysis which have proved useful in establishing the relation of several of the recently isolated rickettsial agents, i. e., North Queensland tick typhus (*8*) and rickettsialpox (*9*) had not been applied to the agent of Siberian tick typhus. Therefore, it appeared worth while to subject several of the Russian strains to such tests. Accordingly, four strains purported to represent the rickettsiae of Siberian tick typhus were obtained from Russia through diplomatic channels during 1946–47. These agents were received at the Rocky Mountain Laboratory where they were used to establish infections in embryonated eggs and guinea pigs. Studies of these strains were made both at the Rocky Mountain Laboratory and the Army Medical Department Research and Graduate School. This article describes the results obtained at the latter institution.

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Clinical and Laboratory Findings Reported in Literature

A summary of Pletsity's (*3*) clinical description of Siberian tick typhus is as follows: Two or 3 days after being bitten by an infected tick, four out of five cases develop a lesion at the site of the bite. This consists of an area of infiltration ¾ to 1 inch in diameter surrounding an area of necrosis. At the same time there is regional lymphadenitis and possibly lymphangitis. After 3 or 4 days the infiltration subsides and the necrotic area becomes covered by a scab. Usually, the onset of constitutional signs and symptoms does not occur until after the acute localized manifestations have subsided; hence, the incubation period, between bite and generalized symptoms, is 8 to 11 days with a range from 6 to 16 days. The illness is characterized by headache, fever, pains in the extremities and, in some instances, vomiting. Typically a rash appears on the 3d day of fever, beginning on the upper extremities and extending over the entire skin surface. This eruption consists of large polymorphous rose-colored papules which remain discrete. These disappear in about 2 weeks without pigmentation or desquamation. The temperature ranges between 102° and 104° F. for 6 or 7 days before falling by lysis to normal levels between the 8th to 14th day after onset. As a rule, the patients do not appear acutely ill; neuropsychic symptoms are not marked; there are no cardiovascular signs or symptoms, and examination of the respiratory system reveals only a slight bronchitis. Convalescence is rapid, and most cases feel well a few days after the fever abates. The prognosis is good and there are no fatal cases on record. Abortive cases have been reported by Baidin (*10*). These fail to develop a rash and are often confused with grippe. A considerable number of cases give a history of a previous attack of epidemic typhus (*3*), usually occurring many years previously. There is no evidence that the disease is in any way modified in such patients.

A positive Weil-Felix test is obtained with the serum of some cases during the 1st week of illness, and almost all patients develop antibodies by the 10th or 12th day. Titers up to 1:6400 are found with OX19 antigen, and a titer of 1:400 may persist for as long as 3 months after recovery. Positive reactions are elicited with OX2 antigen but the titers are usually low, i. e., from 1:25 to 1:400. Frequently, however, a positive reaction appears earlier in the illness with the OX2 strain than with the OX19 organism. Sometimes positive tests with the OXK antigen appear late in the disease but then only at low titers.

Rickettsiae of Siberian tick typhus have been isolated from man, ticks, and rodents (*1*, *11*) and have maintained their characteristics after passage for 50 generations in guinea pigs. Coincident with the febrile reaction, about 40 percent of infected male guinea pigs show swelling and edema of the scrotum which lasts 3 to 5 days. On the other hand, Korshunova (*6*, *12*) working with strain G, Far East typhus, failed to obtain these scrotal reactions in inoculated male guinea pigs.

Four strains of the agent isolated in the Krasnoyarsk area of Central Siberia were found by Korshunova (*1*) to be immunologically identical. However, one of these, strain B, recovered from a human case, showed no cross-immunity with strain G from the Khabarovsk area. Furthermore, she reported strain G to be unrelated to the agents of epidemic typhus fever and boutonneuse fever. On the other hand, infection with strain B induced resistance to boutonneuse fever and infection with epidemic typhus resulted in some immunity to this strain. The reverse cross tests, however, gave negative results in both instances. A summary of Korshunova's findings is given in table 1.

Table 1. *Cross-immunity tests in guinea pigs*

Animals immune to	Challenge strain			
	Far East typhus (G)	Siberian tick typhus (B)	Epidemic typhus (Otto)	Boutonneuse fever
Far East typhus (G)	+	0	0	0
Siberian tick typhus (B)	0	+	0	+
Epidemic typhus (Otto)	0	+*	+	0
Boutonneuse fever	0	0	0	+

+ Immunity.
0 No immunity.
*Test indicates this immunity is partial only.

Material and Methods

Strains of Rickettsiae. All available data on the four strains of rickettsiae received from Russia are shown in table 2. Other rickettsiae used in the study were Breinl strain of epidemic typhus, Wilmington strain of murine typhus, Phillips strain of North Queensland tick typhus, Molish strain of South African tick bite fever, and the Bitterroot strain of Rocky Mountain spotted fever.

Infectious Inoculum. Two types of infectious inoculum were employed in the current study. Each of the four Russian strains received from the Rocky Mountain Laboratory was maintained by passage in yolk sacs of embryonated eggs and in guinea pigs. Infectious yolk sac tissue served as inoculum for embryos used in the preparation of vaccines and for complement-fixing antigens. Infectious guinea pig materials, employed for passage of the strains and for challenge inocula, consisted of 10 percent suspensions of tissue or whole blood. The materials used in each case were epidemic typhus—brain; murine typhus—tunica washings; Siberian tick typhus—brain, or brain, spleen, and tunica mixture; North Queensland tick typhus and South African tick bite fever—spleen suspended in tunica washings; and Rocky Mountain spotted fever—heart blood.

Table 2. *History of four strains of agent of Siberian tick typhus fever rickettsia as received at Army Medical Department Research and Graduate School*

	Strain Designation			
	No. 1	No. 3	D11	XON
Original isolation	Krasnoyarsk area	Khabarovsk area	U. S. S. R.	U. S. S. R.
Original name	Strain B	Far East typhus Strain G	Strain D11	Strain XON.
Received in United States as	Lyophilized mouse lung	Lyophilized mouse lung	Not stated; probably lyophilized mouse lung	Not stated; probably lypohilized mouse lung.
Shipped to AMDRGS from Rocky Mountain Laboratory as	Lyophilized guinea pig spleen and tunica	Lyophilized guinea pig spleen and tunica	Lyophilized yolk sac (4th egg passage)	Lyophilized yolk sac (4th egg passage).
Date received at AMDRGS	Sept. 1946	Nov. 1946	July 1947	July 1947.

Technique of Cross-immunity Experiments. Groups of four to six guinea pigs which had been afebrile for at least 2 weeks after recovery from a typical clinical infection with one of the rickettsial agents served as immune animals for the test. These were then challenged by inoculation with 0.1 ml. of suspension of the appropriate rickettsial strain and at the same time groups of normal guinea pigs were also infected. After inoculation the animals were placed in an air-conditioned room and observed for 21 days during which period their temperatures were recorded daily. The response of the guinea pigs was measured by both the febrile and the scrotal reaction. A temperature recording of 104° F. or more was considered as fever and the febrile response of each group was recorded in two ways: (a) the number of animals showing fever and (b) the mean number of fever days in febrile animals. Scrotal reactions were also recorded both with respect to incidence and duration.

Vaccines. Two of four lots of vaccine used in the study were commercial preparations made from the Breinl strain of epidemic typhus. The other two were prepared in our laboratory from an egg-adapted line of the Siberian strain No. 3 in essentially the same manner used in the commercial manufacture of epidemic typhus vaccine, i. e., formalinized yolk sac suspensions which were extracted with ether to remove certain nonrickettsial materials.

Technique of Vaccination Tests. The appropriate vaccine was administered subcutaneously in two doses of 0.5 ml. each, given 7 days apart to groups of 10 male guinea pigs each weighing approximately 450 grams. Two weeks after the 2d dose the animals were challenged by inoculation with 0.1 ml. of a suspension containing one of the rickettsial strains and at the same time 10 nonvaccinated guinea pigs were given an equal amount of the same suspension. The reaction to infection was measured in the same manner as described for the cross-immunity experiments.

Complement Fixation Antigens and Antisera. Washed suspensions of *Rickettsia prowazeki* and *Rickettsia mooseri* prepared in the manner described by Plotz et al. (*13*) were used as complement-fixing antigen. Similar washed rickettsial antigens were prepared from the four Russian strains. Preparations containing soluble antigen free of intact rickettsia were prepared from materials designed for use as vaccines. These were subjected to high speed centrifugation and the resultant supernatant fluid served as soluble antigen. Antiserum was obtained by bleeding convalescent guinea pigs 2 to 4 weeks after recovery from induced infection with each of the rickettsial agents.

Technique of Complement Fixation Tests. Complement fixation tests were performed using the techniques regularly used in this laboratory (*13*). In brief, this method employed 0.25 ml. of diluted antigen, 0.25 ml. diluted serum, and 0.5 ml. of diluted fresh guinea pig serum containing two full units of complement. In determining the complement-fixing activity of unknown antigens, four units of antibody were added to serial dilutions of the material to be tested and, conversely, the sera to be tested were set up in serial dilution against two units of antigen. After incubation at 4° C. overnight, the hemolytic system was added and the test incubated at 37° C. for one-half hour and read in the usual manner. The data recorded in table 8 were obtained from tests which were all performed in one day, and the same antiserum and antigen from each strain were used throughout.

Results

Reaction of Guinea Pigs to Inoculation with Strains of the Agent of Siberian Tick Typhus. Guinea pigs inoculated with each of the four strains of Siberian tick typhus received at the Army Medical Department Research and Graduate School developed a similar febrile reaction which usually lasted from 4 to 6 days. No difference was noted in the ability of the different strains to cause scrotal reactions in adult male guinea pigs; and regardless of the strain employed, between 40 and 50 percent had swelling and edema of the scrotum. Stained smears from the tunica showed typical Mooser cells containing intracytoplasmic rickettsiae. In the course of these studies, scrotal reactions appeared more frequently in guniea pigs infected with Siberian tick typhus than in those infected with the Breinl strain of epidemic typhus (28 percent). On the other hand, in these investigations the scrotal reaction did not appear as frequently with the Russian strains as with murine typhus (94 percent), South African tick bite fever (87 percent), North Queensland tick typhus (70 percent), and Rocky Mountain spotted fever (63 percent). Sera from guinea pigs convalescent from infection with any one of the four Russian strains contained complement-fixing antibodies which reacted with washed rickettsial antigens in a manner indistinguishable from that of serum of guinea pigs recovered from disease induced by the Breinl strain of epidemic typhus. Serological studies are discussed in some detail in a later paragraph.

The preliminary observations mentioned above seemed to indicate that the clinical aspects of the disease induced in this host by the Russian strains resembled experimental murine typhus more closely than experimental epidemic typhus; however, the antibody response of the animals convalescent from disease caused by the Russian strains was typical of epidemic typhus. At this stage of the investigations, the possibility was considered that these were "intermediate" strains of typhus such as have been reported to exist by other workers (*14*, *15*). Since the technique of cross-vaccination is a well-recognized means of separating closely related but distinct rickettsial agents, it appeared advantageous to apply this method to the study of the relation of the Russian agents to epidemic typhus.

Cross-vaccination Experiments. Groups of guinea pigs were immunized with vaccines prepared against the Siberian strain No. 3 or with epidemic typhus vaccine and tested for resistance to infection

Table 3. *Protection against Siberian strain 3 induced by homologous vaccine and epidemic typhus vaccine*

Vaccinated with						Unvaccinated (controls)		
Siberian TT No. 3			Epidemic T vaccine					
Guinea pig number	Days fever	Days S. R.*	Guinea pig number	Days fever	Days S. R.*	Guinea pig number	Days fever	Days S. R.*
6599	0	0	6653	0	0	6717	3	1
6600	0	0	6654	0	0	6718	5	0
6601	0	0	6655	0	0	6719	6	0
6602	0	0	6656	0	0	6720	3	0
6603	0	0	6657	0	0	6721	8	1
6604	0	0	6658	0	0	6722	6	1
6605	0	0	6659	0	0	6723	5	1
6606	0	0	6660	0	0	6724	5	0
6607	0	0	6661	0	0	6725	4	0
6608	0	0	6662	0	0	6726	4	0
Total	0	0	Total	0	0	Total	49	4

* S. R.=Scrotal reaction.

NOTE: All animals were infected with a suspension of brain, spleen, and tunica tissues from guinea pigs suffering from disease induced by Siberian strain No. 3.

Table 4. *Trivial protection against R. mooseri induced by Siberian and epidemic typhus vaccines*

Vaccinated with						Unvaccinated (controls)		
Siberian TT No. 3			Epidemic T vaccine					
Guinea pig number	Days fever	Days S. R.*	Guinea pig number	Days fever	Days S. R.*	Guinea pig number	Days fever	Days S. R.*
6619	3	4	6683	2	1	6804	4	9
6620	3	3	6684	2	1	6805	4	8
6621	3	1	6685	1	2	6806	4	7
6622	2	4	6686	3	4	6807	4	6
6623	3	4	6687	3	4	6808	5	9
6624	4	5	6688	3	2	6809	5	9
6625	1	0	6689	2	0	6810	6	5
6626	3	4	6690	1	0	6811	4	6
6627	1	0	6691	1	0	6812	3	5
6628	3	2	6692	2	5			
Total	26	27	Total	20	19	Total	39	64

*S. R.=Scrotal reaction.

with one of the Russian strains or with other rickettsial agents. Results typical of those obtained in these studies are summarized in tables 3 and 4. The former presents the data from an experiment in which the animals were challenged by infection with Siberian strain No. 3. Both groups of vaccinated guinea pigs were completely protected against this Russian strain. In this test, each of the control animals displayed a febrile response and some developed a mild scrotal reaction. The failure of the Siberian and epidemic typhus to induce appreciable protection against the agent of murine typhus is indicated by the data presented in table 4. Here guinea pigs immunized with the same materials employed in the experiment summarized in table 3 were infected with *R. mooseri* and all animals, both vaccinated and control, developed fever. The duration of the febrile reaction and the incidence and duration of the scrotal reaction was, however, less among the vaccinated than among the control animals.

An interpretative summary of all of the findings in the cross-vaccination experiments is shown in table 5. Regardless of whether the vaccine used was prepared from organisms of epidemic typhus or the Siberian strain No. 3, the vaccinated guinea pigs showed essentially the same amount of protection when infected with a given rickettsial agent. Furthermore, vaccines prepared from either strain induced equal resistance against infection with the Breinl strain of epidemic typhus fever and all four strains of Siberian tick typhus. Moreover, the degree of resistance induced by vaccination with the Siberian strain against subsequent infection with *R. mooseri* was of the same order as that induced by epidemic typhus vaccine. Vaccination against Siberian strain No. 3 afforded no protection against either North Queensland tick typhus or South African tick bite fever.

Table 5. *Interpretative summary of results of cross-vaccination tests*

Challenge	Vaccine			
	Epidemic typhus		Siberian TT No. 3	
	Lot No. 1	Lot No. 2	Lot No. 1	Lot No. 2
Epidemic typhus	++	++	++	++
Siberian No. 1	+	++	+	----
Siberian No. 3	+	++	+	++
Siberian XON	----	++	----	++
Siberian D11	----	++	----	++
North Queensland tick typhus	----	----	----	0
South African tick bite fever	----	----	----	0
Murine	----	+	----	+

++ Complete or almost complete protection.
+ Partial protection.
0 No protection.

Cross-immunity Tests. Guinea pigs, recovered from infection with one of the Siberian strains or one of the rickettsial agents commonly employed in this laboratory, were tested for resistance to infection with a number of heterologous organisms. The results of a typical cross-immunity experiment are presented in table 6. In this particular test, guinea pigs convalescent from one of the four strains of Siberian tick typhus were injected with the Breinl strain of epidemic typhus. It will be seen that all of the recovered animals were im-

Table 6. *Resistance of Siberian immune guinea pigs to epidemic typhus*

Guinea pig number	Initial infection		Epidemic typhus challenge	
	Siberian strain	Days fever	Days fever	Days scrotal reaction
6800	No. 1	4	0	0
6801	No. 1	0	4	0
6802	No. 1	5	0	0
6745	No. 1	2	0	0
6849	No. 3	2	0	0
6850	No. 3	5	0	0
6768	No. 3	8	0	0
6720	No. 3	3	0	0
6755	No. 3	2	1	0
6778	No. 3	3	0	0
6765	XON	2	0	0
6766	XON	1	0	0
6779	XON	1	0	0
6707	XON	4	0	0
6708	XON	5	0	0
6709	XON	6	0	0
6817	D11	7	0	0
6818	D11	6	0	0
6823	D11	6	0	0
6837	D11	7	0	0
6783	D11	4	0	0
6975	None	----	6	2
6976	None	----	7	0
6977	None	----	2	0
6998	None	----	6	0
6979	None	----	6	1
6980	None	----	7	0

mune to *R. prowazeki.* In one instance, guinea pig No. 6801, which had failed to develop fever following inoculation with Siberian strain No. 1, did show a febrile response lasting 4 days when injected with the organism of epidemic typhus. This animal, however, cannot be considered as having been immune to Siberian tick typhus.

The results of the entire series of cross-immunity tests are summarized in schematic form in table 7. A review of this table shows that complete cross-immunity exists between all the Siberian strains and the Breinl strain of epidemic typhus. All five of these strains also behaved similarly in that they induced considerable immunity against the Wilmington strain of murine typhus. Guinea pigs convalescent from murine typhus were solidly protected against infection with the four Siberian strains. No cross-immunity was demonstrable between the strains of Siberian tick typhus and the agent of Rocky Mountain spotted fever.

The results of cross-immunity tests presented no evidence of a relationship between North Queensland tick typhus and South African tick bite fever and the Siberian strain No. 3. However, D11 and XON infections elicited questionable or partial resistance against both North Queensland tick typhus and South African tick bite fever and guinea pigs convalescent from these two latter infections were partially protected against infection with D11 and XON.

Complement Fixation Tests. The extremely close relation of the Siberian strains to *R. prowazeki* indicated in the earlier complement fixation tests as well as by cross-vaccination and cross-immunity tests led us to investigate the interrelation between these agents by means of complement fixation technique in greater detail. Accordingly, suspensions of washed rickettsiae of the four Russian strains

Table 7. *Summary of results of cross-immunity tests*

Type of immune guinea pigs	Challenge agent								
	Epidemic typhus (Breinl)	Siberian TT No. 1	Siberian TT No. 3	Siberian TT D11	Siberian TT XON	Murine typhus (Wilmington)	Rocky Mt. spotted fever	NQTT	SATBF
Epidemic typhus (Breinl)	--------	++	++	++	++	+	+	--------	--------
Siberian tick typhus No. 1	++	--------	++	++	++	+	0	--------	0
Siberian tick typhus No. 3	++	++	--------	++	++	+	0	0	0
Siberian tick typhus D11	++	++	++	--------	++	++	0	+−	+
Siberian tick typhus XON	++	++	++	++	--------	+	0	+−	+−
Murine typhus (Wilmington)	--------	++	++	++	++	--------	--------	--------	--------
Rocky Mountain spotted fever	--------	0	0	--------	--------	--------	--------	--------	--------
North Queensland tick typhus	--------	0	0	+	+	------	--------	--------	--------
South African tick bite fever	--------	+	0	+	+	--------	--------	--------	--------

++ Solid immunity.
+ Partial immunity.
+− Questionable immunity.
0 No immunity.

Table 8. *Cross-reactions between Siberian, epidemic and murine typhus as demonstrated by complement fixation*

Antibody (4 units)	Antigens					
	Siberian TT No. 1	Siberian TT No. 3	Siberian TT D11	Siberian TT XON	Epidemic typhus (Breinl)	Murine typhus (Wilmington)
	Antigen titers					
Siberian tick typhus No. 1	80	80	120	30	240	40
Siberian tick typhus No. 3	80	80	120	40	240	negative*
Siberian tick typhus D11	80	60	120	40	320	Do
Siberian tick typhus XON	80	80	120	40	320	Do
Epidemic typhus	80	80	120	30	320	Do
Murine typhus	30	15	30	10	negative*	320

*Lowest dilution tested 1:40.

were prepared and these together with our standard epidemic and murine typhus antigens were titrated with their respective homologous convalescent guinea pig sera. On the basis of these titrations the dilution of antiserum was selected which contained four units of antibody against the homologous antigen. These chosen dilutions of antisera were then used in constant amounts with serial dilutions of each antigen in order to determine the titer of each antigen in the presence of homologous and heterologous antibodies. The results of these tests are summarized in table 8. The findings indicate that the four Siberian strains and the Breinl strain of epidemic typhus are indistinguishable from each other. Furthermore, the Russian and Breinl strains behaved similarly in their cross-reactions with the Wilmington strain of murine typhus.

Crude preparations of soluble antigen were made from yolk sac material infected with the four Russian strains and with the standard epidemic and murine organisms. These were employed in cross complement fixation tests in the manner described in the preceding paragraph for washed rickettsial antigens. The same antisera were used in both instances. As was to be expected, the soluble antigens from the Russian strains were indistinguishable from one another and from the epidemic and murine typhus materials.

Discussion

The results of cross-vaccination, cross-immunity, and complement fixation tests indicate that the four Siberian strains are identical and cannot be differentiated from each other by any of these means. They are identical, moreover, with the Breinl strain of epidemic typhus fever. In addition, the Russian agents show a relation to the Wilmington strain of murine typhus which is similar to that displayed by a classical strain of epidemic typhus.

Cross-vaccination and cross-immunity experiments indicate that guinea pigs either vaccinated against Siberian strain No. 3 or convalescent from infection with this strain are not protected against infection with the organisms of either North Queensland tick typhus or South African tick bite fever. However, clinical infection with the D11 and XON Siberian strains gave partial protection against these rickettsiae, and infection with North Queensland tick typhus both and South African tick bite fever made guinea pigs partially immune to infection with the D11 and XON strains. It should also be noted that infection with South African tick bite fever made guinea pigs partially immune to infection with Siberian strain No. 1, but Siberian strain No. 1 immune guinea pigs were susceptible to South African tick bite fever. Similar findings have been encountered in cross-immunity tests with various rickettsiae. For example, guinea pigs convalescent from Rocky Mountain spotted fever are partially resistant to infection with murine and epidemic typhus and, conversely, typhus-immune guinea pigs are resistant to Rocky Mountain spotted fever (*16*, *17*). There is similar resistance to cross-infection with North Queensland tick typhus, South African tick bite fever, and murine typhus (*8*).

Summary and Conclusions

1. Four strains of rickettsiae, supposedly the etiological agents of Siberian tick typhus, have been studied and their relation to one another and to other rickettsiae determined by means of cross-vaccination, cross-immunity, and complement fixation tests.

2. All four strains were found to be indistinguishable from each other and the Breinl strain of epidemic typhus.

3. It is apparent that the cross-immunity reactions displayed by the four Siberian strains in the current tests are distinctly different from those attributed to them by the Russian investigators who themselves report divergent results. Various hypotheses might be offered to explain these differences, but such theorizing appears fruitless. Whether the Siberian strains received here bear an etiological relation to the clinical disease designated as Siberian tick typhus is uncertain. However, if they represent the causal agent of Siberian tick typhus, it is interesting to speculate on the possibility of *R. prowazeki* being maintained by a rodent-tick cycle in nature. This would leave man as only an incidental host who might, under the proper circumstances, start an epidemic of classical louse-borne typhus.

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Q Fever Studies in Southern California

XI. Recovery of *Coxiella burnetii* from Milk of Sheep

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Epidemiological studies of Q fever in southern California (*1*) indicated that dairies and dairy cows were sources of human infection in that area, while epizoological studies showed that large numbers of dairy cows were infected with the disease and were shedding rickettsiae in their milk (*2*). Although dairying is the most extensive livestock industry in Los Angeles County, there are also goat farms, sheep, extensive cattle feeding yards, hog feeding yards, race horse stables, and riding academies. Raising of small animals, such as rabbits, chickens, and turkeys, is also a widespread activity. There are numerous meat packing plants for processing cattle, sheep, and hogs. Some of the cases of Q fever were employees at the Union Stock Yards, at meat packing plants, and at rendering plants, where exposure to a variety of animals, including dairy cows, was a regular experience. Although studies of goats and sheep were not exhaustive and were secondary to the extensive studies of cattle, nevertheless, these possible sources of infection in southern California were considered.

Histories of 300 human cases of Q fever (*1*) suggested sheep or goats as a possible or probable source of infection in only 6 instances. This is in contrast to the observations of Lennette, Clark, and Dean (*3*) in northern California where 81 of 150 confirmed cases had close and frequent contact with sheep and goats; and of Caminopetros (*4*) in Greece where goats and sheep are abundant. Recovery of *Coxiella burnetii* from milk of sheep has been reported by both groups.

Human Cases

The following cases, confirmed by complement fixation tests on serum samples using a specific Q fever antigen, gave a history of contact with sheep, this contact being considered as a possible source of infection:

H. S., a male aged 30, of Placentia, had lived in southern California 3½ years. He was employed as a correctional officer at the Chino

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This work was facilitated by the Q Fever Laboratory, which was established September 12, 1947, in the endemic area of southern California, as a cooperative undertaking of the National Institutes of Health, the California State Departments of Public Health and Agriculture, and the Los Angeles County and City Health Departments.

State Institution for Men, Chino, California. Cows and other livestock were kept on the farm at this institution. About 14 days before onset of illness he had watched the unloading from trucks of a flock of sheep at the institution. These were mostly old ewes recently separated from their lambs and had been trucked in from Kern County, California. This patient also used raw milk regularly from a neighbor's cow. He was taken ill June 26, 1948, and admitted to the Fullerton General Hospital 3 days later with the diagnosis of "fever of unknown origin." A blood sample taken June 27 was negative for Q fever antibodies, but specimens taken July 6 and July 12 were both positive for Q fever at high titer (4+ at 1:64, the highest dilution tested) when tested at the National Institutes of Health.

E. C., a male aged 41, was living at El Monte, California, but worked shearing sheep at Ocean Side, California, 10 days before becoming ill. He was admitted to the Los Angeles General Hospital May 6, 1948, with a tentative diagnosis of Q fever. A blood sample taken May 14 was negative for Q fever and a sample taken 1 week later, May 21, was positive (3+ at 1:64). Both samples were tested at the Viral and Rickettsial Disease Laboratory, Berkeley, California.

On July 18, 1948, 128 sheep in the flock to which H. S. was exposed were bled, and the serums were tested at the National Institutes of Health by the complement fixation test for Q fever. Only 33 of the 128 sheep were completely negative. However, only 13 gave reactions usually regarded as significantly positive, that is 3+ at 1:8 or higher. Eighty-two sheep gave partial reactions less than 3+ at 1:8.

None of the samples was positive at a dilution of greater than 1:16. Such a large proportion of weak reactions has not been experienced in similar surveys of bovine herds, although more than 20,000 bovine samples have been tested. We do not have results on a sufficient number of sheep sera from this or other areas to properly interpret these results. It seems likely that the hemolytic test system used, consisting of sheep red cells and antisheep cell amboceptor, may give some nonspecific reactions when sheep serums are tested. However, the 13 reactions in serum dilutions of 1:8 and 1:16 in the test, as run at the National Institutes of Health, is suggestive of specific antibodies for Q fever.

Tests of Lacteal Secretions

This herd of ewes had been separated from their lambs more than 2 months. Lacteal secretion samples from 104 of the 128 ewes were combined in a total of 13 pooled samples representing from 5 to 10 sheep each.

For preliminary testing, two composite samples (A and B) were prepared, each of which contained milk from 52 sheep. The remaining pooled samples were frozen and stored below freezing temperature.

Each composite sample was tested by injecting two normal guinea pigs with 4 cc. intraperitoneally and 1 cc. subcutaneously. These animals were bled after a 30-day period, and their serums were tested by the complement fixation technique. One animal that received milk from composite A was positive at 1:64, the highest dilution tested. The other animal that received milk from composite A and both animals that received milk from composite B gave weak reactions of questionable significance. Portions of both composite samples of sheep milk were sent under refrigeration to the Rickettsial Laboratory at the National Institutes of Health where they were tested in guinea pigs with negative results.

After receipt of these results, the 13 pool samples were then removed from cold storage and each was tested in two guinea pigs in a similar manner. A normal control animal was kept in the cage with each pair of injected guinea pigs.

Three of the 26 injected animals died of undetermined causes before the 30-day test period was completed. The remaining 23 and the 13 controls were bled at the end of the 30 days and their serums were tested for Q fever antibodies by complement fixation. Nineteen animals representing 11 pools of sheep milk and all of the 13 control animals were entirely negative. One guinea pig that received milk from pool 4 was positive by complement fixation test at a titer of 1:64, the highest dilution tested. Its mate gave a moderately high titer, showing complete fixation at 1:32; 2+ at 1:64. One animal that received milk from pool 12 was positive at a titer of 1:64 and its mate was negative. These reactions are summarized as follows:

Sheep milk pool	*Guinea pig*	*Complement fixation titer 30 days after injection*
4	96, 149	4+ at 1:64.
	96, 150	2+ at 1:64.
12	96, 173	4+ at 1:64.
	96, 174	Negative in all dilutions.

Milk of pool 4 was reinjected in three guinea pigs. One animal died; one was positive by complement fixation test after a 30-day interval; and the third animal was sacrificed and tissues were passed to two fresh animals. One of these was held for 30 days and was positive by complement fixation test. The other was sacrificed on the 10th day and tissues sent to the National Institutes of Health where the strain was successfully maintained through six additional animal passages, established in chick embryo cultures, and identified as *Coxiella burnetii* (Derrick). This strain has been designated as the "chino" strain.

Further confirmation that this strain of infection was Q fever was made by reciprocal cross-immunity tests with the Dyer strain of Q fever, which was isolated in 1938 (*5*) from a human case of the disease. The results of these cross-immunity tests are summarized in the table.

Cross-immunity tests of "sheep" strain with Dyer strain in guinea pigs

Animal No.	Recovered from—	Challenge strain	Date inoculated	Days incubation	Days fever
A			*1949*		
41882	Dyer strain	Sheep-milk strain	Feb. 11	21	0
41883	do	do	do	21	0
41599	do	do	Feb. 17	21	0
41600	do	do	do	21	0
B					
43653	Normal control	Sheep-milk strain	Feb. 11	3	4
43654	do	do	do	4	2
43655	do	do	do	4	3
43656	do	do	do	4	3
43657	do	do	Feb. 17	6	1
43658	do	do	do	6	1
C					
43582	Sheep-milk strain	Dyer Q	Mar. 28	21	0
43653	do	do	Mar. 21	21	0
43655	do	do	Mar. 28	21	0
43656	do	do	Mar. 21	21	0
D					
44233	Normal control	Dyer Q	Mar. 21	3	6
44234	do	do	do	3	5
44235	do	do	do	6	4
44236	do	do	do	3	4
44249	do	do	Mar. 28	3	7
44250	do	do	do	3	7
44251	do	do	do	3	7
44252	do	do	do	3	4

Four guinea pigs, which had recovered from infection with the Dyer strain, and six normal controls were injected intraperitoneally with 2 cc. of a spleen and liver suspension from guinea pigs infected with the sheep-milk strain. Animals recovered from the Dyer strain remained afebrile for a period of 21 days. Each of the six normal animals given the sheep-milk strain of inoculum developed 1 to 4 days of fever after incubation periods of 3 to 6 days.

Four of the animals which had recovered from the sheep-milk strain of infection were challenged with the Dyer strain of Q fever by receiving intraperitoneally 2 cc. of spleen and liver tissue suspension from infected guinea pigs. All four animals remained afebrile, whereas each of the eight normal controls receiving similar injections developed 4 to 7 days of fever after incubation periods of 3 to 6 days.

The clots from the blood samples of these sheep had been saved in a frozen condition and were likewise tested by guinea pig injection upon obtaining positive tests from the composite milk samples. Clots from each 10 sheep were pooled, macerated, and injected into two animals. A normal control was maintained with each pair of test animals. Thirteen test animals and two controls died before the 30-day test period was completed. The 13 surviving test animals and

11 controls bled on the 30th day were all negative for Q fever by the complement fixation test.

Summary

Two of 300 cases of Q fever in southern California gave histories of contacts that specifically suggested sheep as a source of infection.

Low titered reactions with Q fever antigens were demonstrated in the complement fixation test by serums of sheep from one flock. Lacteal secretions from these sheep produced Q fever in test animals, and a strain of *Coxiella burnetii* was established in guinea pigs and was identified by accepted criteria.

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(*2*) Huebner, R. J., Jellison, W. L., Beck, M. D., Parker, R. R., and Shepard, C. C.: Q fever studies in southern California. I. Recovery of *Rickettsia burneti* from raw milk. Pub. Health Rep. **63**: 214–222 (1948).

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Cultivation of Fixed Rabies Virus in Embryonated Duck Eggs

By H. M. Powell, Sc. D., and C. G. Culbertson, M. D.*

In the last few months we have experimented with cultivation of fixed rabies virus in embryonated duck eggs apparently with at least a moderate degree of success.

In this work we have used mainly a strain of rabies virus known in this laboratory as "N. I. H.," and originally obtained from the National Institutes of Health. We have also used strains "H. L.," "Park," "Phillips," and "Harris." These strains were obtained from the Rabies Vaccine Department of this laboratory. A stock of mouse brain virus of the different viruses served as seed virus.

The fertile duck eggs used were first incubated 7 days at about 37° C. At this time, they were injected with doses of 0.2 cc. of 10^{-2} dilutions of rabies seed virus in the same way that embryonated hen eggs are infected with influenza virus. The 7-day inoculated duck eggs were incubated an additional 14 days at about 35° to 36° C. At this time, the sterile embryos were recovered in the usual way, weighed, and spun 2 or 3 minutes in a Waring Blendor with sufficient physiological salt solution to make a 1:10 dilution.

Intracerebral mouse tests were conducted with decimal dilutions of duck embryo virus. At this writing, 3 serial passages of N. I. H. duck embryo virus have been made in duplicate lines of passage. The results of these tests are as follows:

Virus dilution	*Passages*					
	1A	*1B*	*2A*	*2B*	*3A*	*3B*
10^{-1}	6, 6	5, 7	6, 6	6, 6	7, 7	5, 6
10^{-2}	6, 7	6, 7	6, 6	6, 7	7, 8	7, 8
10^{-3}	6, 9	6, 6	6, 6	7, 8	8, 10	9, ?
10^{-4}	6, 8	8, 9	6, 6	9, S	8, 10	9, 9
10^{-5}	– –	9, 9	6, 8	8, 10	7, S	S, S
10^{-6}	– –	5, 9	7, 8	10, S	S, S	S, S
10^{-7}	– –	– –	7, S	S, S	S, S	S, S
10^{-8}	– –	– –	8, S	S, S	S, S	S, S

NOTE.—Each figure indicates day of death of 1 mouse; S indicates survival 14 days; - indicates not done

Aside from the N. I. H. strain, the other four strains of rabies virus mentioned have been subjected to attempted passage in duck embryonated eggs 1, 2, or 3 times for the different strains, and duck embryo virus titers of 10^{-3} to 10^{-5} have been obtained. In addition to virus titers in the embryo proper, titers of 10^{-2} or slightly more have been noted in some of the periembryonic fluids.

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*Lilly Research Laboratories, Indianapolis.

Of the duck embryo rabies virus strains, the N. I. H. strain in duck passage 2 has been found to be neutralized specifically by rabbit anti-rabies serum (anti-H. L. strain) furnished by Dr. MacFarlane of this laboratory. The other strains have not been tested. The N. I. H. duck embryo virus (the only one tested) has produced in two rabbits, following intracerebral injection, the usual symptoms and death occurring after customary rabbit injection of rabbit fixed rabies virus.

The N. I. H. strain of duck embryo pooled passage two rabies virus was used for vaccinating mice as a vaccine potency test according to National Institutes of Health test methods. A 1:20 dilution of active stock 1:10 virus (0.5 percent suspension) was used for intraperitoneal mouse doses of 0.25 cc. each. Six doses were given during two weeks, i. e., on Monday, Wednesday, and Friday of each week, and on Monday after the last Friday's dose, the mice were challenged intracerebrally with decimal dilutions of the N. I. H. strain of mouse brain virus. The results were as follows:

Virus dilution	*Immunized mice*	*Control mice*
10^{-1}	(1), (1), 6, 9, 9, 11, 11, S, S, S	6, 7, 7, 7, 7, 7, 7, 8, 8, 8
10^{-2}	(1), 6, 10, 12, 13, S, S, S, S, S	7, 8, 8, 8, 8, 8, 8, 8, 9, 9
10^{-3}	7, 9, 11, 11, 12, 12, 12, S, S, S	7, 7, 8, 8, 8, 8, 8, 9, 9, 10
10^{-4}	8, S, S, S, S, S, S, S, S, S	8, 8, 9, 9, 9, 9, 9, 9, 9, 10
10^{-5}	13, S, S, S, S, S, S, S, S, S	8, 8, 9, 9, 10, 10, 10, 11, S, S
10^{-6}	—	7, 7, 8, 8, 10, S, S, S, S, S
10^{-7}	—	7, 8, 8, S, S, S, S, S, S, S

NOTE.—Each figure indicates day of death of 1 mouse; S indicates survival 14 days; - indicates not done

It is computed that the immunized mice resisted 7,700 LD_{50} of challenge virus.

At this writing, additional immunization tests are being done in mice. Also, further transmission of the virus in embryonated duck eggs is being tried, and other problems which obviously suggest themselves are being studied.

This preliminary note is published so that others who may be particularly interested in this virus can try such experiments without delay.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MARCH 4, 1950

The reported incidence of influenza in the Nation increased for this week from 14,556 cases last week to 24,705. The 5-year (1945–49) median is 5,337. The cumulative total for the first 9 weeks of the year is 88,901 as compared with the corresponding cumulative total of 41,359 for 1949, and a 5-year (1945–49) median of 41,359.

Increases over the previous week in reported cases of influenza were shown in all the geographic divisions except the New England and Pacific Divisions, with the largest being in the South Atlantic Division (from 3,469 to 7,047). For most of the individual States, increases were reported. Some of the larger increases were in Alabama (from 295 to 638), Arkansas (from 297 to 516), Colorado (from 226 to 612), Georgia (from 209 to 443), Kentucky (from 27 to 358), Montana (from 383 to 1,541), Oklahoma (from 543 to 1,297), Tennessee (from 123 to 654), Texas (from 8,549 to 10,738), and Virginia (from 2,377 to 5,524). A few States showed no change and six States reported decreases.

Increases over last week may be noted in reported cases of pneumonia (2,457 to 3,118), measles (8,172 to 9,584), meningococcal meningitis (85 to 87), scarlet fever (1,862 to 1,938), and whooping cough (2,447 to 2,962). New Jersey reported 1,022 cases of measles as compared with 494 last week, and a 5-year (1945–49) median of 993. Other States reporting increases in reported cases of measles were Massachusetts (165 to 306), Minnesota (57 to 219) and New York (561 to 958).

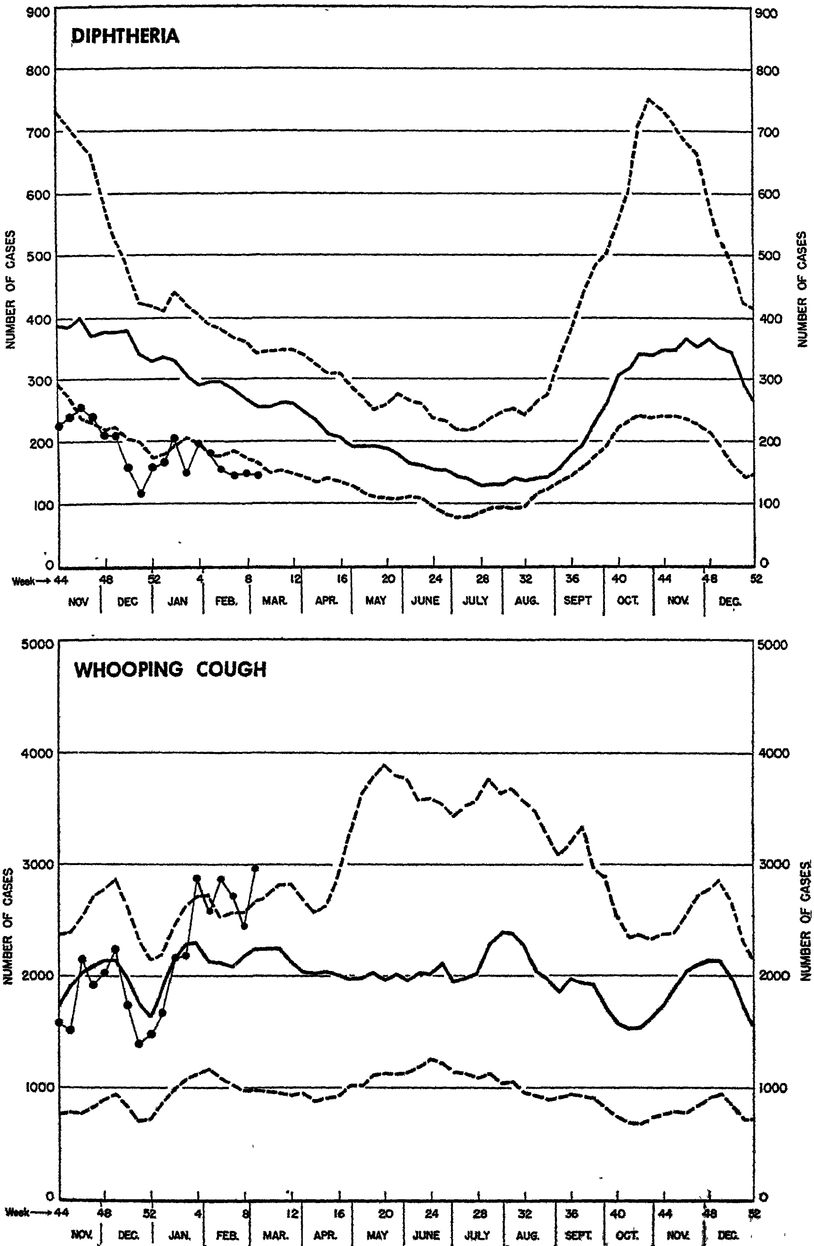
Decreases from the previous week occurred in diphtheria (149 to 143), poliomyelitis (97 to 82), typhoid and paratyphoid fever (46 to 45), and rabies in animals (168 to 151).

Two cases of smallpox were reported in the United States, one each in Arkansas and Oklahoma.

A total of 10,218 deaths was recorded during the week in 93 large cities in the United States as compared with 9,470 last week and a 3-year 1947–49 median of 9,712. For the year to date the total is 86,413 as compared with 88,112 for the corresponding period last year.

Communicable Disease Charts

All reporting States, November 1949 through March 4, 1950



The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 5 preceding years. The solid line is a median figure for the 5 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks, 1949–50.

Telegraphic case reports from State health officers for the week ended March 4, 1950

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	------	------	------	11	------	5	------	------	7	------	------	------	34	------
New Hampshire	------	------	2	------	------	6	------	------	2	------	------	------	4	------
Vermont	------	------	------	6	------	1	------	------	5	------	------	------	10	------
Massachusetts	6	------	------	306	1	------	------	------	105	------	------	3	117	------
Rhode Island	1	------	------	1	------	11	------	------	2	------	------	------	38	------
Connecticut	------	------	------	17	------	40	1	------	24	------	------	2	122	------
MIDDLE ATLANTIC														
New York	6	3	[2] 18	958	7	283	9	------	[3] 150	------	------	1	189	10
New Jersey	2	1	7	1,022	2	120	1	------	69	------	------	------	173	------
Pennsylvania	7	------	------	369	4	188	------	------	127	------	------	1	199	1
EAST NORTH CENTRAL														
Ohio	11	------	7	258	7	96	2	------	329	------	------	1	199	8
Indiana	6	2	25	173	------	22	1	------	74	------	------	1	36	8
Illinois	3	------	6	160	7	98	2	------	79	------	------	2	89	1
Michigan	------	5	8	2,492	1	44	4	------	175	------	1	1	300	4
Wisconsin	------	------	80	334	1	20	------	------	88	------	------	------	120	------
WEST NORTH CENTRAL														
Minnesota	------	------	9	219	1	4	2	------	25	------	------	------	40	1
Iowa	------	------	35	636	3	4	1	------	16	------	------	------	11	------
Missouri	2	------	12	8	2	35	------	------	27	------	1	------	46	------
North Dakota	1	2	73	4	1	106	------	------	7	------	1	1	3	------
South Dakota	3	------	------	20	1	------	------	------	6	------	------	------	------	------
Nebraska	------	------	16	162	------	6	1	------	9	------	------	------	10	------
Kansas	1	------	190	9	------	17	1	------	25	------	------	------	32	------
SOUTH ATLANTIC														
Delaware	------	------	------	33	------	------	------	------	7	------	------	------	10	------
Maryland	6	------	15	33	1	45	------	------	56	------	------	1	82	------
District of Columbia	------	------	3	90	------	29	------	------	7	------	------	------	2	------
Virginia	6	------	5,524	55	2	156	------	------	17	------	1	4	40	2
West Virginia	11	------	974	131	1	25	------	1	21	------	------	------	86	11
North Carolina	5	------	------	187	1	------	------	------	35	------	------	------	76	------
South Carolina	1	------	88	51	2	12	2	------	2	------	4	2	20	7
Georgia	7	------	443	40	4	185	1	1	7	------	3	2	29	6
Florida	2	------	------	27	2	8	2	------	1	------	1	2	10	3

EAST SOUTH CENTRAL														
Kentucky	7	--------	358	142	4	10	1	--------	34	--------	--------	2	27	16
Tennessee	7	--------	654	149	4	--------	--------	--------	34	--------	1	3	58	8
Alabama	6	--------	638	73	--------	99	--------	--------	16	--------	--------	2	23	9
Mississippi	8	--------	54	85	1	33	--------	--------	17	--------	--------	3	5	--------
WEST SOUTH CENTRAL														
Arkansas	3	--------	516	42	2	68	1	--------	5	1	4	--------	48	2
Louisiana	1	--------	4	8	2	46	3	--------	1	--------	1	5	2	1
Oklahoma	1	--------	1,297	7	2	76	--------	--------	7	1	1	--------	13	2
Texas	14	1	10,738	219	8	959	30	--------	43	--------	1	1	253	45
MOUNTAIN														
Montana	--------	--------	1,541	124	--------	--------	--------	--------	14	--------	--------	--------	24	--------
Idaho	--------	--------	183	10	--------	22	--------	--------	11	--------	--------	--------	16	--------
Wyoming	--------	--------	257	28	--------	3	--------	--------	1	--------	--------	--------	--------	--------
Colorado	1	--------	612	71	2	75	--------	--------	16	--------	--------	--------	57	2
New Mexico	--------	--------	3	22	--------	13	2	--------	4	--------	--------	--------	18	3
Arizona	2	--------	245	181	--------	43	--------	--------	17	--------	--------	1	84	--------
Utah	--------	--------	30	204	1	5	--------	--------	4	--------	--------	--------	17	--------
Nevada	--------	--------	--------	7	--------	1	--------	--------	--------	--------	--------	--------	--------	--------
PACIFIC														
Washington	2	--------	16	86	3	--------	2	--------	60	--------	--------	1	42	--------
Oregon	--------	--------	11	34	2	32	2	--------	12	--------	--------	--------	29	--------
California	5	4	13	280	5	67	11	--------	138	--------	--------	3	119	1
Total	144	18	24,705	9,584	87	3,118	82	2	1,938	2	20	45	2,962	151
Median, 1945–49	253	7	5,337	18,962	95	--------	48	--------	3,032	4	14	47	2,142	--------
Year to date (9 weeks)	1,490	107	88,901	54,585	783	21,777	980	8	15,776	14	[4] 207	408	22,460	1,288
Median, 1945–49	2,724	63	41,359	93,989	798	--------	405	5	24,941	31	198	383	20,136	--------
Seasonal low week ends	(27th) July 9	--------	(30th) July 30	(35th) Sept. 3	(37th) Sept. 17	--------	(11th) Mar. 19	--------	(32d) Aug. 13	(35th) Sept. 3	--------	(11th) Mar. 19	(39th) Oct. 1	
Since seasonal low week	5,761	--------	119,431	73,715	1,696	--------	42,462	--------	32,215	21	--------	3,781	43,996	--------
Median, 1944–45 to 1948–49	10,290	--------	77,629	120,113	1,734	--------	19,349	--------	50,423	85	--------	3,922	42,863	--------

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[1] Including cases reported as salmonella.
[2] New York City only.
[3] Including cases reported as streptococcal sore throat.
[4] Deduction: Arkansas, week ended Feb. 25, 1 case.

Alaska: Whooping cough, 1.
Hawaii: Influenza, 28; poliomyelitis, 2; whooping cough, 2.

PLAGUE INFECTION IN EDDY COUNTY, NEW MEXICO

Under date of March 3, plague infection was reported proved in 8 fleas, *Thrassis fotus*, taken from 5 grasshopper mice, *Onychomys leucogaster*, trapped February 16, 1950, along U. S. Highway 83, 2 miles west of Loco Hills, Eddy County, New Mexico.

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended February 11, 1950—During the week ended February 11, 1950, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	2		14		266	331	38	38	79	130	898
Diphtheria				1	3	2					6
Dysentery:											
Amebic						1					1
Bacillary					5	1				2	8
German measles			53		11	278	1	44	334	408	1,129
Influenza			19			19	7			4	49
Measles			11		158	723	37	54	81	133	1,197
Meningitis, meningococcal							1				1
Mumps			82		470	667	14	59	79	449	1,820
Scarlet fever	3		4	1	65	49	18		70	16	226
Tuberculosis (all forms)	24			19	98	32	8	8	124	51	364
Typhoid and paratyphoid fever					12	2			2		16
Undulant fever					5	1					6
Venereal diseases:											
Gonorrhea	7	2	24	9	89	48	20	10	52	70	331
Syphilis	5		4	3	106	36	5	9	1	19	188
Whooping cough			9		79	77	11	13	2	18	209

FINLAND

Notifiable diseases—January 1950—During the month of January 1950, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Diphtheria	69	Typhoid fever	8
Meningitis, meningococcal	13	Venereal diseases:	
Paratyphoid fever	83	Gonorrhea	537
Poliomyelitis	12	Syphilis	54
Scarlet fever	820		

JAPAN

Influenza—During the week ended February 11, 1950, 2,746 cases of influenza were reported in Japan.

MEXICO

Poliomyelitis—During the period January 15 to February 11, 1950, 20 cases of poliomyelitis were reported in Mexico City, and for the period January 22 to February 11, 7 cases were reported in Monterrey.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—During the week ended February 25, 1950, cholera was reported in India as follows: Cuddalore, six cases; Madras, one case; Masulipatam, three cases; Negapatam, two cases; Tuticorin, two cases.

Plague

Ecuador—Loja Province—During the week ended January 3, 1950, one case of plague was reported in Celica County, Loja Province.

Siam (Thailand)—During the week ended February 11, 1950, three cases of plague were reported in Siam.

Smallpox

Burma—During the week ended February 25, 1950, 100 cases of smallpox were reported in Bassein and 122 cases were reported in Rangoon.

India—During the week ended February 25, 1950, 33 cases of smallpox were reported in Bombay, 22 cases in Delhi, and 305 cases in Madras.

Mexico—During the period January 15 to February 11, 1950, 14 cases of smallpox were reported in Mexico City.

Typhus fever

Japan—During the week ended February 25, 1950, 61 cases of typhus fever were reported in Yokohama, and 35 cases in Tokyo.

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Yellow fever

Bolivia—Under date of February 18, 1950, 70 cases of yellow fever with 15 deaths were reported in Chiquisaca Department, Bolivia.

Gold Coast—During the week ended January 11, 1950, one case of yellow fever was reported at Ankobra Junction Station; hospitalized in Bogoso.

DEATHS DURING WEEK ENDED MAR. 4, 1950

	Week ended Mar. 4, 1950	Corresponding week, 1949
Data for 93 large cities of the United States:		
Total deaths	10,218	9,712
Median for 3 prior years	9,712	--------
Total deaths, first 9 weeks of year	86,413	88,112
Deaths under 1 year of age	667	627
Median for 3 prior years	671	--------
Deaths under 1 year of age, first 9 weeks of year	5,618	5,985
Data from industrial insurance companies:		
Policies in force	69,844,153	70,565,749
Number of death claims	14,508	13,645
Death claims per 1,000 policies in force, annual rate	10.8	10.1
Death claims per 1,000 policies, first 9 weeks of year, annual rate	9.8	9.6

World Health Day

The United States is joining with more than 60 nations in the international observance of World Health Day on April 7. In connection with the United States observance, the Division of International Health, Public Health Service, has prepared information kits providing background material on international health activities. This material will be useful to those desiring to take part in local observances. The kits will be distributed to State and local health officers on the basis of requests received. Please address requests, indicating the number of kits desired, to Dr. L. L. Williams Jr., Chief, Division of International Health, Public Health Service, Federal Security Agency, Washington, D. C.

The information kits will include the following items: (1) statement by Dr. Brock Chisholm, Director General of the World Health Organization; (2) statement by Federal Security Administrator Oscar R. Ewing; (3) statement by Surgeon General Leonard A. Scheele; (4) pamphlet on the World Health Organization; (5) article on United States participation in world health programs; (6) Working for World Health (excerpts from annual report of Public Health Service); (7) Improved Health Conditions in Europe from an address by Senator Allen J. Ellender; (8) Frontiers in World Health (excerpts from address by the Surgeon General; (9) Cooperative Health Programs of the Institute of Inter-American Affairs; (10) list of United States members of the WHO expert committees.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

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Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

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Notifiable Diseases, Fourth Quarter, 1949

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Public Health Reports

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Nutrition Programs in State Health Departments

By a Subcommittee of the Committee on Diagnosis and Pathology of Nutritional Deficiencies*

VOLI

Introduction

The tremendous influence of nutrition on the health and productivity of population groups is just beginning to be appreciated. Recent advances in the science of nutrition have indicated the fundamental role which essential nutrients play in bodily economy and have stimulated a growing appreciation of the significance of nutrition in all fields of medicine and public health. The social, economic, and political importance of adequate nutrition is well illustrated by the attention given to this subject in international deliberations.

Increasing awareness of the relationship of nutrition to many aspects of public welfare warrants the assignment of a more important place to nutrition programs in State and local health departments. Nutritional welfare of large segments of the population could be improved, particularly in certain areas and among special groups. It has been shown that the diets of a high percentage of persons in this country fail to measure up to the Recommended Dietary Allowances of the Food and Nutrition Board of the National Research Council. The extent and severity of malnutrition, however, remains largely unknown and is still the subject of considerable controversy. Carefully controlled investigation with the use of newer techniques is essential in delineating this problem. The health department has a unique opportunity for fact-finding in this field.

It is recognized that malnutrition is not only responsible for the well known deficiency diseases but is a contributory cause or a complication of numerous other pathological states. Accordingly, nutrition knowledge should permeate all branches of the health department. The possibilities for improvement of nutritional status have only begun to be explored.

The improvement of nutrition and the correction of existing nutritional deficiencies are the immediate objectives of any nutrition program. The ultimate aim should be the attainment of optimal nutritional status by the entire population. Although optimal nutrition cannot be clearly defined as yet, the wide application of current information should lead to marked improvement in general health. In order to fulfill these objectives it is essential to determine, first, the needs of the community, then the existing facilities which are available for meeting these needs, and finally the additional facilities which are desirable and feasible for implementing an effective program. The most urgent problems should be attacked first and plans made for gradual expansion.

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*Report prepared for the Food and Nutrition Board, National Research Council, Washington, D. C.

In the early development of nutrition programs in State health departments, the nutritionist carried the major responsibility for the program. Emphasis was on food and on educational programs to promote the consumption of adequate diets. Recent developments have focused on the diagnosis of the various deficiency diseases which make up the over-all problem of malnutrition and on the causes and effects of the deficiency diseases and the interrelationship between them and other diseases. With these developments, the physician trained in public health nutrition has entered this field and the biochemist has become closely associated with it. The full application of the science of nutrition to public health requires the integration and coordination of activities relating to diets, general and special, to education, and to medical nutrition. Ideally all nutrition activities should be coordinated in a specific unit of the health department under the leadership of a physician with special training in nutrition and with the assistance of nutritionists and a biochemist. The nutrition unit should serve in a consultant and advisory capacity to all divisions of the health department, supervise the training of personnel in various aspects of nutrition, and cooperate with agencies throughout the State in formulating a broad nutrition program. A

The Food and Nutrition Board has desired to foster the interest of public health agencies in the problems of human nutrition. For this purpose, a subcommittee on Diagnosis and Pathology of Nutritional Deficiencies was appointed and has prepared this report after much consultation and extensive discussion. One of the objectives is to increase the interest of both State and local health agencies in the opportunities for service to the public along nutritional lines. Another is to facilitate the process of getting nutrition education to both the general practitioner of medicine and the lay population. Since it appears to all those who are studying this field of work that there is an urgent need for physicians with special training in human nutrition, it would seem that until a demand for such medical specialists is built up, no supply will be forthcoming. It is hoped, therefore, that this effort may increase the public demand for such specially trained medical personnel.

State nutrition council should be of great assistance in program planning and coordination of effort. The nutrition unit of the State health department has a major responsibility in developing a program and services which are adequate for the protection and promotion of nutritional health of the people.

Details concerning the development, activities, personnel, and administrative organization of a nutrition program in State health departments are considered in the discussion which follows.

Evolution of Nutrition Service in State Health Departments

Food Control Activities

The earliest concern of State health agencies with food was with its purity. In the years between 1880 and 1889, four States passed legislation vesting in the health agency powers for controlling the contamination or adulteration of foods with substances deleterious to health. During succeeding decades other States followed suit. In some of these States, however, the enforcement of food control was placed in the Department of Agriculture. With the passage of the Federal Food and Drug Act of 1906, many State laws were rewritten to bring them into conformity with the Federal statute. At the present time, the authority rests with the health agency in 20 States. The closely related interests of food control and nutrition programs of State health agencies have been apparent from the outset and have received new recognition with the recent passage by 26 States and 2 Territories of legislation for the compulsory enrichment of white flour and bread.

Closely allied with enforcement of pure food laws and equally important to the nutrition of the citizenry has been the health agency's responsibility for the sanitary conditions under which foods are produced, dispensed, and consumed. Encouragement by public health workers of increased milk consumption, for example, has been possible only in areas where the milk supply was known to be safe. In recent years, the sanitation and nutrition staffs of State health agencies have worked hand-in-hand to make sure that school lunch programs meet the standards of both and that food handlers have an intelligent interest in what they are preparing or dispensing as well as in how they are doing it.

In one State, California, the Chief of the Bureau of Food and Drugs in 1899–1901 conducted some dietary studies among fruitarians and Chinese in cooperation with the State Agricultural Experiment Station. This seems to be the earliest record of nutrition research involving a State health agency.

Combating Pellagra

The realization that malnutrition was a pressing public health problem in certain areas came as a result of the pellagra studies that Dr. Joseph Goldberger of the Public Health Service carried on between 1914 and 1929 with the cooperation of the health departments in the States concerned. Dr. Goldberger and his associates demonstrated that pellagra was the result of a poor diet and could be both treated and prevented by introducing into the diet those common foods that contained the "pellagra preventive" factor. The discovery that this factor was abundantly present in dried yeast provided State health agencies with a cheap and effective weapon against pellagra even before the identification of niacin as the specific therapeutic agent some 20 years later. With the active support of the Medical Service of the American National Red Cross, yeast was made widely available to State and local health departments in the regions where pellagra was endemic. Distribution of dried yeast through special pellagra clinics or through general clinics of the health agency and an intensive educational campaign on the benefits of home gardens conducted in cooperation with agricultural extension workers were major activities by which public health workers waged a successful fight against pellagra in the South.

The Child Hygiene Movement

Not until public health began to be concerned with the well-being of individuals in the population did official State agencies the country over assume much responsibility for applying the growing body of evidence of the relation of diet to health. It is no accident that nutrition service came into State health agencies as part of the child hygiene movement. In 1912, the first division of child hygiene in a State department of health was established in Louisiana. In 1913, McCollum and Davis working in Wisconsin, and Osborne and Mendel in Connecticut, reported their classical experiments on the vitamins. Studies of infant and maternal mortality showed the need for stressing maternal and child hygiene as a public health measure. The newer knowledge of nutrition threw light on the relation of food to health at all ages, but especially during periods of rapid growth and development. Laboratory findings of nutrition investigators were paralleled by clinical observations by pediatricians. This new knowledge had to be put to work for the benefit of those in the population for whom good nutrition is of the most importance, women during the maternity cycle and growing children. Child health programs in State health agencies opened the way for the application of both preventive and curative measures in child nutrition.

Early emphasis on nutrition activities in behalf of children beyond the age of infancy was placed on the correction of malnutrition. The criteria for the diagnosis of malnutrition were the height-weight tables based on measurements of fairly large numbers of children in certain sections of the country. Children whose weight for height and age fell outside an arbitrarily established normal range were considered underweight or overweight and treated accordingly. For the underweight, special nutrition classes were set up and a regimen of rest and supplementary feeding arranged in schools. Pediatricians soon became convinced that weighing and measuring alone did not select children in need of nutritional rehabilitation, although the information obtained from successive examinations at regular intervals has continued to aid in clinical assessment. Meanwhile, the search has gone on for objective indices of nutritional status.

Emphasis on the early supplementation of milk with potent sources of vitamin D and ascorbic acid resulted in the virtual disappearance of severe rickets and scurvy among infants receiving continuous health supervision. Nutrition knowledge was applied successfully to the feeding of infants and children by general practitioners and also by physicians entering the comparatively new specialty of pediatrics. Instruction in the fundamentals of nutrition has become part of the professional preparation or in-service education of such other workers in the field of maternal and child health as general practitioners of medicine, dentists, nurses, social workers, teachers, and health educators. The effect of emotional factors on the nutrition of the young child now receives widespread acceptance among pediatricians and other child-health workers. The influence of nutrition on both mother and child during pregnancy and lactation has been demonstrated in striking fashion within the past 10 years. That short time has seen the application of the new knowledge to the care of maternity patients, especially in the prenatal and postpartal periods. These findings have also supplied further evidence that the health of mother and child is inseparable, with the consequent evolution of "child hygiene" programs into "maternal and child health" programs.

The practical application of nutrition knowledge takes up a considerable proportion of the time of the team of workers engaged in a community maternal- and child-health program. In order that nutrition shall receive due attention, it has seemed desirable to assign to the team a worker with special training in that field. The nutritionist has been given responsibility for seeing that the other members of the team have essential nutrition knowledge and skill in applying it.

Beginnings of Nutrition Service

The health departments of Massachusetts and New York were the first to employ a nutritionist. They took this action about the same time (in the 1915-to-1920 period), and they have had continuous service ever since. Both States had as their objective a specialized program in health education. The nutritionist who was appointed to the "hygiene staff" in Massachusetts in October 1917 had as her title "Health Instructor in Foods." This was the period of direct service by specialists in public health, so it was logical that the nutritionist should work with the school nurse, instructing children selected by the school physician as malnourished and visiting homes to carry the same message to the parents. As additional workers were employed, a nutritionist gave full time to the tuberculosis clinics for children of school age, conferring with those showing X-ray evidence of active infection. In New York the nutritionist soon shifted the emphasis in her service from individual teaching to staff education and promotion of educational activities in communities.

Growth of Nutrition Service

The extension of nutrition service in health departments has been influenced by many factors. The number of workers employed has been affected by the amount of money available to the State from its own tax funds and from Federal grants-in-aid. During the period between 1921 and 1929, when States were relatively prosperous and Federal funds for maternal and child health were appropriated under the Sheppard-Towner Act, a few additional States (among them Illinois, Michigan, Mississippi, and Connecticut) inaugurated nutrition services. Only one of these, Connecticut, continued the service in the face of the withdrawal of Federal aid in 1929 and the sharp reduction in State revenues during the depression of the early 1930's. In Connecticut one worker combined the duties of health educator and nutritionist. The Biennial Reports of the California State Department of Health for the years 1928–30 and 1930–32 make reference to the services of a consulting dietitian and a nutrition advisor, both confining their activities to the Bureau of Tuberculosis. With the passage of the Social Security Act in 1935 and its subsequent amendments, State health agencies could count once more on Federal aid for the employment of nutritionists. The committee of the Association of State and Territorial Health Officers which advised the Children's Bureau on appropriate types of professional personnel for State maternal and child health services specifically mentioned nutritionists. The Public Health Service informed the State health departments that Federal funds from that agency might be used for the salaries of nutritionists. When the Social Security Act became effective, three State health departments were employing a total of nine nutritionists. As of December 1947, 50 out of 53 State health departments (including the District of Columbia, Hawaii, Puerto Rico, Alaska, and the Virgin Islands, since they participate in Federal grants for maternal and child health on the same basis as the States) were budgeting funds for the employment of 170 nutritionists. The distribution of positions in the States was as follows:

Number of Positions	*Number of States*
10	2
9	2
7	2
6	3
5	3
4	8
3	6
2	11
1	13
0	3

Source of Funds for Nutrition Service

Budget forms in current use in State health agencies do not yield detailed information as to the source of funds for specific positions. In the most recent year, 1945–46, that such data were available, the source of funds for the maintenance of nutrition services was as follows:

	Percent
Children's Bureau	63
Public Health Service	*9
State and other	28

*In the case of the Public Health Service, Federal assistance to the States also takes the form of the assignment of personnel to carry out nutrition investigations.

Because Federal and State funds have not been earmarked for nutrition service, the decision to use them for that purpose rather than for other public health purposes has rested with the administrative officials of the agency. On several occasions, the expansion of nutrition services in State health departments has been recommended by the Conference of State and Territorial Health Officers. The sharp increase in the number of State health departments employing nutritionists during the war may have been related to the activity of State nutrition committees in focusing attention on the need for additional personnel. The total number of nutrition positions now budgeted by State health agencies probably does not reflect the potential demand for nutritionists. Among the 170 positions budgeted in December 1947, there were 34 vacancies, some of long standing. Agencies have become discouraged in their search for qualified workers and have tended to discontinue positions that they have seen no hope of filling. Although salaries of nutritionists have increased and are frequently in line with other salaries in the health agency, they still do not compare with financial rewards in other positions open to workers trained in nutrition. It has proved especially difficult to recruit physicians with special preparation in nutrition for State public health positions.

Qualifications and Training of Nutritionists Employed

Prior to the amendment to the Social Security Act in 1939, which provided for the establishment and maintenance of personnel standards on a merit basis, the setting of qualifications for nutritionists was the responsibility solely of the State agency. Most of these, however, were guided by the recommendations of a joint committee of the American Home Economics Association and the American Dietetic Association, which were later modified and accepted also by the Committee on Professional Education of the American Public Health Association.[1] These recommended qualifications cover a series of positions of varying degrees of responsibility. Since all nutritionists in State health agencies whose salaries are paid wholly or in part from Federal funds or State funds used for matching Federal grants come under State civil service or merit systems, formal class specifications for the types of nutrition positions that exist in the agency or are contemplated by it have been established and have become effective when approved by the Federal agencies administering grants-in-aid.

To meet the need for personnel to expand health services, State agencies have been encouraged by the Children's Bureau and the Public Health Service to use some of their grant-in-aid funds for professional training of individuals already employed or to be employed. These two Federal agencies have jointly issued policies governing the use of Federal funds for training. Records indicate that during the last three academic years, 23 nutritionists have received a year of graduate training in nutrition as applied to public health on stipends from State health departments. So far all the States have used maternal and child health funds for training nutritionists.

According to the most recent information available to the Children's Bureau, the most advanced academic degrees held by 136 nutritionists actually employed as of December 1947 by State health departments may be grouped as follows:

Academic degree	*Number holding*
M. D.	2
Ph. D.	3
M. D. and Ph. D.	1
M. P. H.	1
M. S. or M. A.	78
B. S. or B. A.	51

The number of nutritionists in State health departments who have completed a dietetic internship in a hospital or food clinic course approved by the American Dietetic Association is estimated at 52.

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[1] Educational qualifications of nutritionists in health agencies. American Journal of Public Health 36: 45–50, January 1946.

The number of qualified nutritionists is limited by the facilities for their advanced academic training and for supervised field experience. At the present time, six colleges and universities are offering a formal graduate curriculum in nutrition as applied to public health. Others have taken some steps toward offering such a program and are currently arranging schedules for occasional graduate students who wish to specialize in public health nutrition. Advice to these institutions on request is one of the activities of the Nutrition Unit of the Children's Bureau. A few schools of public health offer special training in nutrition for physicians. At least two medical schools provide intensive postgraduate preparation for physicians in techniques for assessing nutritional status.

The New York State Department of Health has instituted a program of nutritionist training in an attempt to meet the urgent need for supervised public health experience in nutrition. Closely supervised field service is offered to candidates with good academic backgrounds who lack field experience. A flexible program covering 12 months' experience includes orientation in general public health relationships, direct nutrition service to individuals and groups, consultant services to professional personnel, and participation in studies of nutritional status of population groups and other research activities.

That training facilities need to be expanded may be indicated by an analysis of the years of service with their present agency of the nutritionists at work in December 1947.

Years of service in present position	*Number of nutritionists*
Less than 1	51
1 to 2	15
2 to 3	20
3 to 4	12
4 to 5	6
5 to 6	7
6 to 7	3
7 to 8	3
8 to 9	3
9 to 10	3
More than 10	13
Total	136

Of the 51 who had been employed in their present position less than 1 year, 11 had a record of previous employment with a public health agency.

Placement of Nutrition Service in Administrative Organization of Health Agency

The placement of the nutrition service in the agency is the decision of the State administration. With an occasional exception, all nutrition staffs have been placed in a single unit, from which workers may be assigned either for general service in a geographical area or specialized service, such as participation in a special training project or dietary consultation to hospitals and other health facilities. According to recent information the placement of nutrition services follows the pattern below:

Placement of nutrition service	*Number of States*
Unit (bureau or division) responsible to State health officer	6
Unit within major bureau or division	39
Maternal and child health	26
Local health administration	3
Preventive medical services	2
Health education	2
Unit within subdivision of major bureau or division	8
Maternal and child health	8

Evolution of Functions of Nutrition Workers

As nutrition services have expanded and additional workers have been employed there has been a differentiation of functions. The job of the supervisor has three main aspects: program planning and direction, staff development, liaison with other organizations and agencies in the nutrition field. With the call for skills in a given field, it has seemed preferable to employ one or more specialists for State-wide service to supplement the activities of general staff nutritionists assigned to a geographical area. Thus, State agencies engaging in nutritional assessment need physicians and biochemists as well as nutritionists. As of December 1947, two State health agencies were employing physicians on a full-time basis to head their nutrition units; a third had the part-time services of a physician. Some health departments which administer or license and inspect hospitals and other health facilities are employing experienced dietitians to serve as consultants. Except for a short period in California, the first specialist employed by a State health department to give full time to dietary consultation began service as recently as 1946. By the summer of 1948, at least 12 States had created such a position.

Evolution of Nutrition Activities

Although the nutrition units are still administered through the maternal and child health bureau or division in a majority of States, their work has been broadened to include service in nearly all aspects of the public health program. Nutritionists are giving service to many divisions of the health agency, notably those that have responsibility for adult hygiene, communicable disease control, tuberculosis control, cancer control, dental health, industrial hygiene, hospital construction and licensure, medical rehabilitation, and food sanitation. (In giving this service nutritionists work in close cooperation with divisions of health education and public health nursing.) It is recognized that improvement in the diet and nutritional status of an individual is not likely to be achieved without improvement in the dietary of the family or institutional group of which that individual is a member. However, attention needs to be given to the individual as well as to the group because his intake may be below average and his requirements above average.

From reports submitted regularly by the States to the Public Health Service and the Children's Bureau and from reviews of programs made by these Federal agencies in the States, it is possible to gain some idea of the relative emphasis placed at a given time on the various activities that constitute the nutrition program of the agency. By comparing these reports from year to year, the following emphases and trends can be noted:

A. Activities Receiving Major Attention

1. *Education and consultation* continue to be a major activity. In-service education of the agency staff fell off sharply during the war but has since been resumed as vacancies in local health units have been filled. As noted elsewhere, consultation to hospitals and other health facilities administered or licensed and inspected by the agency is a new and rapidly expanding service. Consultation to industries received some emphasis in industrial States during the war but appears to have dwindled since then. Consultation to practicing physicians appears to be on the increase.

2. *Information Services*. Preparation, selection, and distribution of educational materials still receive considerable attention of staff. However, as agencies have developed departments of health education, the nutrition unit has tended to function as technical advisors on content of material produced in, or distributed by, the agency.

B. Activities Assuming Greater Prominence

1. *Investigations and Research*. Appraisals of nutritional status are carried on in a small but slowly growing number of States. These are the States that have one of the following types of resources: (1) A full-time or part-time medical director of the nutrition unit; (2) a cooperative arrangement with a medical school, a school of public health, an agricultural college, or a research agency financed from agricultural or other funds; (3) a team from the Nutrition Branch of the Public Health Service.

Other forms of fact-finding, including dietary studies, are being used increasingly as a basis for program planning.

2. *Coordination of Programs, Policy-making, and Interpretation*. These closely related activities cannot be considered major from the standpoint of time devoted to them, but they are expanding as the nutrition unit operates at the program-planning level in the agency.

C. Activities Receiving Less Emphasis

1. *Direct service,* except as a medium of consultation and staff education, now tends to be undertaken only in connection with special projects or demonstrations that are being carried on by State staff in a limited area.

Nutrition Activities of a State Health Department

The wide scope of activities open to a nutrition service in a State health department has been indicated. It is increasingly recognized that improvement in the nutritional health of the people cannot be accomplished solely by giving advice on what to eat and by making treatment available for cases of deficiency diseases. Consumption of the proper foods is influenced by availability and price, and some motivation to eat the right foods as well as knowledge of a good diet is needed to change diet habits. Also, the nutritive quality of food is affected by conditions under which it is grown and by methods of production and processing before the food reaches the consumer, as well as by methods of preparing it in the home or restaurant. Furthermore, the nutritional health of an individual may be affected adversely by special conditions other than food intake, and many persons have special diet problems because of age, activity, acute or chronic disease, etc. Clearly, there are many components to the nutrition problem which call for application of different skills. Food supply, prices, distribution, etc., are problems for agricultural and economic experts, but the essential relationship of food, with respect to both quantity and quality, to health gives the health department a responsibility to interpret the nutritional needs of the population as they affect programs of food production and distribution. Educational agencies share with the health department responsibility for nutrition education. Many other aspects of the nutrition problem are largely the direct responsibility of the health department and require a program of varied services.

The many activities through which a State health department can promote better nutrition for its population may be grouped into three general types. One type operates for the benefit of the population as a whole, a second type is directed to segments of the population, and a third type deals directly with families or individuals. Activities which contribute directly or indirectly to better nutrition for the population as a whole include measures to improve the quality of foods and to increase their availability at more reasonable prices, programs to extend and improve professional education in nutrition, and mass education on nutrition. The second type is similar to the first, but the activities are planned to meet the needs of members of particular groups who are affected nutritionally by some specific situation. Improvement of food facilities for workers in industrial plants, improvement of diets in institutions, and school lunch programs are examples of group services. The third type of activity includes those in which the public health worker gives some direct service toward the solution of nutrition problems of an individual or family. All three classes of activity are needed, and within each class there are many and varied activities which can contribute to a higher nutritional status for the population.

In most States, in addition to the State health department, a number of other agencies, both official and voluntary, will have responsibility for or be engaged in activities that will form an essential part of the total nutrition program. Various nutrition services may be given by Federal or State extension services, by State departments of agriculture, labor, institutions, welfare, etc., by colleges of agriculture, of home economics and of medicine, and by other agencies. It may be assumed that the health department will not replace or duplicate nutrition activities of other agencies but will cooperate with them to develop a broad and carefully planned State program. However, the nutrition unit of the State health department has a special responsibility to see that the programs and services available are adequate to protect and promote the nutritional health of the people.

With full recognition that the nutrition activities conducted by the State health department will vary from State to State, the activities that comprise a well-rounded nutrition program may be discussed briefly. The activities are discussed according to the three broad types described, that is (1) those that are planned to benefit directly or indirectly the general population; (2) those designed to promote better nutrition for members of specific groups; and (3) direct services to individuals or families.

State-wide and General Activities

General activities for the promotion of better nutrition of the population of the State which may be included in a program of a State health department are listed below. Responsibility for a few of these activities may rest with the State health administrator rather than with the nutrition unit.

A. Administration, Policy, and Program

1. Collaboration with other agencies, civic organizations, and regional and State commissions on policy and program planning where these have a bearing on the health of the people. Some of the areas in which the health department may not have direct or full responsibility but in which due consideration should be given to the effects of both short- and long-term plans on nutritional health include:

(*a*) Food production programs which should take account of dietary needs of the present and expected future population determined on the basis of sex, age, type of work, food consumption patterns, etc.

(*b*) Improvement and control of the nutritional quality of foods at all stages from the farm to the consumer. All plans, including proposed legislation, with reference to processing, distributing, and storing of foods, to enrichment of foods with specific nutrients, and to setting standards for foods should be evaluated in terms of their potential effect on nutritional health.

(*c*) Legislation and regulations to prevent adulteration, false or misleading labeling, insanitary handling of foods, etc.

The role of the health department in these areas usually will be chiefly advisory, but it may be necessary for the health department to stimulate interest and to initiate and suggest programs in these fields to promote nutritional health in the State.

2. Coordination of the activities of all the official and voluntary agencies operating in the field of nutrition in the State. A permanent State nutrition council or committee comprised of representatives of agencies operating in the nutrition field is recommended to cooperate with the State health department in formulating and promoting a complete and well-integrated nutrition program. A further function of this committee, or of a working subcommittee, would be to cooperate with the administrative officer for nutrition of the State health department in clearly defining the specific activities and services to be provided and also the areas or population groups to be served by each agency so that there will be no overlapping or duplication of effort. If no State committee exists, interagency agreements on activities should be drawn up.

3. Enforcement of laws and regulations dealing with food products, food handling, and food service where these are under the jurisdiction of the health department. If this authority rests with another agency of government, the health department should cooperate with it.

4. Administration of or collaboration on measures for financial and technical assistance to cooperative nutrition activities, local agencies for nutrition service, research projects, etc.

B. Investigations and Research

5. Investigations to determine the nature and magnitude of the nutrition problem in the State. Fact-finding to provide definitive evidence on the prevalence of malnutrition and its causes is of the greatest value in shaping the program to provide the most needed services and should be a continuing activity to evaluate progress and keep the program dynamic and related to need. The most satisfactory data are obtained by surveys of carefully selected samples of

the population which represent different groups of specific socioeconomic status, educational level, national origin, urban or rural environment, etc.[2]

Surveys should be of two types, one to collect data on dietary intake and food habits, and the other to collect data on the prevalence of specific deficiency diseases, underweight, and obesity. It will be helpful to collect both types of data for the same persons, but it is not necessary to limit the two types of surveys to the same population.

In order to interpret the survey findings in relation to the importance of various causes of unsatisfactory diets and of malnutrition, there should be investigations to identify, as far as possible, the conditions and factors associated with the consumption of poor diets and the occurrence of deficiency diseases. This would include study of the availability and prices of foods of special nutritional importance in different areas and at different seasons; relation of food consumption to income levels; study of the attitudes of people concerning the consumption of various foods and their knowledge of dietary requirements; and the investigation of other factors contributing to poor nutritional status, such as chronic infections and disease, physiological and emotional stress, and dental status.

Information may be collected from various sources to supplement the data from special surveys or, if surveys cannot be made, to substitute for them. All available data on food supplies and prices, socioeconomic status of the population, diet habits, prevalence of various diseases, and nutritional status of the population should be utilized.

6. Research on methods for application of the newer knowledge of the science of nutrition to public health programs and to extend our knowledge of the relation of nutrition to health and disease. It is often desirable to test new procedures or techniques by means of a demonstration or pilot study conducted on a limited population under controlled conditions so that results may be evaluated. Obviously, the types of research that might be undertaken are numerous and are constantly changing.

> A few examples of nutrition research that have an important bearing on public health methods may be cited. Study of the relation of nutrition to the health of mothers and infants is an example of research on the public health application of new knowledge. Methods for appraisal of nutritional status are fundamental to a program of case-finding and corrective measures. Many diagnostic criteria, both clinical and biochemical, are now available for a number of deficiency diseases, but the reliability of some of these

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[2] Data from homogeneous samples of the population selected by approved sampling methods can be used for estimates applicable to the entire State or to sections of a State. Similarly, populations of larger areas than a single State could be studied from surveys of properly selected samples of the total population. Therefore, several States might pool their resources in order to make more detailed investigations than each could make separately. There has been a trend toward regional studies of economic, educational, social, and nutritional problems. This approach could well be expanded in the nutrition field.

criteria and their significance as indices of malnutrition need further testing. In the case of biochemical criteria, more data on representative groups of persons are needed for the purpose of developing standard values for maintenance of good nutritional status. Therapeutic studies on persons with specific clinical lesions are needed to improve our knowledge of the relation of particular nutrients to these lesions, and of the dosages and time required for cure There is need to evaluate methods of teaching nutrition to different sex-age groups and to study the effectiveness of various media for mass education. Finally, there is the type of investigation which seeks to measure the effects of improved nutritional status. A number of studies have shown that diets of high nutrient content improve the health of pregnant women and of their babies. The field for this type of research is broad and has scarcely been touched.

At present, few State nutrition units will have the personnel, facilities, and funds to conduct research projects. They should encourage investigations on a cooperative basis with other groups, such as universities, colleges, or State experiment stations, many of which have had wide experience in nutrition research, as well as with voluntary agencies. Domiciliary institutions offer especially favorable conditions for studies of deficiency diseases and of the relation of nutrition to other diseases.

C. Laboratory Services

7. The biochemical tests and hematological examinations which are used in the appraisal of nutritional status require laboratory facilities. Whether a nutrition laboratory is established within the nutrition unit or as a section in a State health laboratory will depend on local situations. In either case, the service should be coordinated closely with that of the nutrition unit. The laboratory personnel not only would participate in surveys of malnutrition among population groups conducted by the nutrition unit but also would furnish diagnostic service to this and other health department units, such as maternal and child health, chronic disease, etc., and give diagnostic service in special cases on request of private physicians and medical services of institutions, etc.

A mobile laboratory is most helpful in making extensive surveys of malnutrition and also may be desirable where the State supplements limited local health services by conducting health clinics in scattered areas.

D. Education in Nutrition

8. Professional education.

(*a*) In-service training for the staff of the State health department and of other health agencies, for school teachers, and for personnel of other departments and agencies which give, or should give, some nutrition service. This may be provided through special courses or institutes, through temporary demonstration services, and through consultation with staff personnel.

(*b*) Education of practicing physicians in clinical nutrition, in food values and planning special diets, and in the relation of nutrition to disease by arranging or conducting institutes, demonstrations, or special classes.

(*c*) Promotion of more courses in educational institutions for public health training in nutrition for physicians, nutritionists, nurses, social workers, and teachers and cooperation with such institutions by arranging for field experience.

9. Education of members of auxiliary groups or services.

(*a*) Interpretation of the nutrition program to members of civic organizations to foster public support and understanding.

(*b*) Instruction of managers and supervisors of restaurants and other food services, of cooks, and of food handlers, on menu planning, on methods of cooking and storing foods, and on food sanitation.

E. Information Service

10. Information service on nutrition facts and on methods and materials for a nutrition program. This service should cooperate closely with the health education unit in the preparation of materials such as leaflets, bulletins, posters, radio scripts, etc., to be used for public education on nutrition. Information also would be furnished to:

(*a*) Personnel in the State health department;

(*b*) Personnel in local health agencies;

(c) Personnel in institutions, other agencies, restaurants, industrial establishments, etc.;

(*d*) Members of the medical profession desiring information on clinical aspects of nutrition, on new developments in diagnosis and treatment of deficiency diseases, or on nutritional aspects of specific diseases;

(*e*) Individuals requesting advice on nutrition.

F. Dietary Recommendations and Standards

11. Formulation of special dietary allowances from approved nutrient standards for individuals in specific sex-age groups having different degrees of activity or special need, as in case of pregnancy or ill health, and preparation of low-cost food budgets for institutions and for public-assistance agencies.

Services for Specific Groups

The nutritional health of many persons may be improved by measures which create an environment that is favorable to the consumption of nutritionally adequate diets. Wherever groups of people obtain one or more of their meals from some regular food service, there is an opportunity to influence the diet of those using the service. The function of the health department in relation to institutions and agencies providing food service is to give technical guidance in the planning of menus and in the preparation and serving of foods.

Some measures for promoting the nutritional health of special groups are discussed briefly.

1. *Food Service in Schools.* Cafeterias or lunchrooms in schools should furnish highly nutritious meals at minimum cost and can be utilized effectively as a focus for diet education. Nutrionists in the health department should cooperate with the educational authorities to develop in the schools food programs that will serve this dual purpose. An advisory or consultant service to the supervisors or managers of lunchrooms may be given, usually by local nutritionists, on such matters as economy in buying, menus, methods of cooking to preserve nutritive quality, and the use of eye appeal in food arrangements and service. Nutritionists also may cooperate with teachers and health education instructors in methods for relating classroom discussion of food values, optimum diets, and preparation of foods to the foods and menus served in the lunchroom.

The subsidized school lunch program has been widely adopted and is an effective means of improving the nutritive quality of the diet of large numbers of children. This may be a complete lunch, a breakfast, or the serving of one or two foods such as milk and fruit with or between regular meals. The nutrition unit of the health department can assist in these school lunch programs in several ways. From data collected on prevalence of different deficiency diseases, it can give guidance on specific foods or nutrients that are most needed; and, from studies of local dietary patterns, it can give advice on menus and foods that have maximum acceptability. However, it often will be necessary to serve foods that are not commonly included in the local dietary or are not liked by the children. The nutritionist can help in developing an education program that is adjusted to the specific food habits which need to be changed. Another important way that the nutrition service of the health department can help is by cooperation in educating the public to the need for and value of the school lunch program and by giving support to plans for raising funds through taxation or other means.

2. *Other Child-feeding Programs.* The health agency should provide technical guidance in the planning and operation of food service in centers for day care of young children, at playgrounds, and at summer camps.

3. *Industrial Nutrition Programs.* Food in adequate amounts and containing essential nutrients is needed to maintain the nutritional health of workers. Nutritional health, in turn, affects the capacity for physical work and resistance to infection and to special stress or exposure such as heat, toxic chemicals, etc. In addition to the nutrition problems common to the population as a whole, such as food

habits, knowledge of good diets, and availability and cost of foods, the problem of feeding facilities for workers is important and often complicated. The nutrition unit of the State health department should assume leadership in the promotion of programs for adequate food facilities for industrial groups and give consultant service to dietitians and food service managers in industrial plants.

Industrial physicians, nurses, and social workers should be included among the professional personnel for whom special training on nutrition is arranged, and plant physicians should be encouraged to look for nutritional deficiency diseases among employees.

4. *Institutional Feeding.* Large numbers of persons are residents of public institutions and other institutions licensed by the State or under some degree of State supervision. These include mental hospitals, hospitals for chronic invalids, convalescent homes, homes for the aged and for orphans, correctional institutions, and prisons. Diet is under complete control, and maintenance of good nutritional health is an essential part of adequate care and rehabilitation of all persons living in institutions. The nutrition staff of the health department should consult with the proper authorities concerning the nutritional health of institutional populations. Examination of residents to determine their nutritional status would furnish data on the adequacy of diets and select individuals in need of special nutritional treatment. Nutritionists should advise on planning diets of good quality at minimum cost and on methods of cooking, storing, and handling of foods. Special training may be arranged for personnel in such institutions who plan the meals and cook the food.

A similar type of consultation service should be available to hospitals caring for patients with acute disease or temporarily hospitalized because of a chronic condition. Nutritionally adequate diets are important in promoting recovery and convalescence, and for many patients special diets are needed.

Direct Service

Group Teaching. Dietary instruction to members of special groups should supplement measures such as the above for improving food services and facilities. Group teaching often may be used effectively to reach more persons than can be given individual advice. Nutritionists at the State level may prepare teaching manuals appropriate for specific groups to be used by local nutritionists and other health personnel and may conduct demonstration classes.

Group teaching should be utilized for persons selected as having homogeneous nutrition interests and problems. Groups for which classes might be arranged include:

(*a*) Pregnant women. May be drawn from prenatal clinic patients.

(*b*) Mothers attending well-baby clinics or receiving visits from public health nurses.

(*c*) Persons with chronic conditions requiring special diets, such as those with diabetes, high blood pressure, obesity, etc.

(*d*) Parents of school children.

(*e*) Clubs of high-school-age girls.

(*f*) Clubs of high-school-age boys.

(*g*) Wives of employees in industrial plants, and women employees.

(*h*) Members of neighborhood or social clubs, or mothers of children using neighborhood centers for boys and girls.

Individual Service. Direct service to individuals or families is in most cases provided by local public health agencies through the divisions (or bureaus) of maternal and child health, school health, adult health or chronic diseases, tuberculosis, communicable diseases, etc. Persons receiving health supervision from any of these divisions are the same persons who are most vulnerable to nutritional deficiencies and need nutritional guidance and help. With few exceptions, supervision related to the nutritional health of such individuals should be an integral part of the general health supervision and should be given by the public health nurse, physician, or other professional personnel in the operating health unit which has responsibility for the individual and his family. The function of the specialists in the nutrition unit will be largely that of training other health personnel to recognize and deal with nutrition problems and of giving consultation on request of the other health personnel. The State nutrition staff should cooperate with local nutrition specialists where such are available.

One important individual service that may be an activity of the nutrition unit is the clinical diagnosis of nutritional deficiency diseases. This service would operate chiefly on a referral basis, that is, persons suspected of having a nutritional disease needing treatment would be referred for examination from other health department units such as the school health service, tuberculosis clinic, etc. The results of the examination and recommendations would be sent to the referring health unit, which would be responsible for continuing health supervision. Physicians of the State nutrition service might arrange regular periodic diagnostic clinics in different communities, or visit clinics held by other health units, but regular health supervision would remain the function of the local health department or of other members of the State health department. As progress is made in training physicians in clinical nutrition and they gain experience in diagnosing deficiency diseases, the need for specialists to assist at health clinics and to conduct special nutrition clinics will diminish. The goal should be to have nutritional evaluation a routine part of any health examination.

In connection with nutrition surveys of samples of the population, cases of malnutrition will be discovered. The field unit making the survey will not have the staff to follow up such cases with dietary instructions and referral for any needed therapeutic service. Therefore, arrangements should be made with local health units to provide the needed follow-up of these cases. There is no better opportunity for obtaining the interest of families in nutritional health than that afforded by treatment of a recognized deficiency, and a follow-up service coordinated with a diagnostic survey can be an effective means of promoting the health of a large number of families.

Priorities in the Nutrition Program of a State Health Department

In the planning and administration of the nutrition program of a State health agency, it will be found necessary to assign priorities to the various activities which might be undertaken by its nutrition unit. This is so because available personnel and funds will not often permit a wide advance on the broad front of nutritional improvement; a new program should be a growing one, expanding into new areas as it succeeds in old; and a growing public and professional acceptance of the importance of the work done by the nutrition unit will broaden its opportunities for service. Following is a discussion of the basis upon which priorities may be assigned to the different possible activities of the nutrition unit.

Selection of Priorities

Assignment of priorities to the component parts of the nutrition program involves a decision as to their relative importance, a selection of the activities which should receive most attention and draw most heavily on funds and personnel time, and a consideration of the order in which various activities might best be initiated. Final decision in regard to these matters can only be made after careful study and due consideration of the needs and resources actually existing in the State for which the program is planned. A general discussion of some of the factors which influence the assignment of program priorities may be helpful; a model program applicable to any State can hardly be outlined at the present time. Effective planning calls for the skillful matching of nutritional needs, and resources for meeting these needs, in a given area and at a specified time.

Determination of Needs. The first step in planning a nutrition program for a State health agency is to assemble all available information which may have some bearing on the nutrition problems existing within the State. The information to be collected includes all available data concerning the State and its people in regard to social and economic factors, health and illness, cultural patterns, educational attainment, and diet habits; all available information regarding the nutritional status of the population groups found within the State as well as studies of the nutritional status of similar population groups in other States; and information regarding available food supplies, production and distribution, retail outlets, home food production and conservation, and the relation between food costs and income levels. A careful study of this body of information will enable the director of the nutrition unit to make a number of general statements regarding the nutrition problems of his State and will call to his attention the existence of numerous localized problems in various areas and among various population groups which should receive special attention.

The provision of a survey unit to study the nutritional status of the people and to determine the prevalence and kinds of malnutrition within the State and the epidemiological factors which are responsible will be of great assistance in directly establishing the need for nutritional betterment. Such a survey program not only is an effective way of discovering needs but has the added advantage that it focuses the attention of professional and lay groups on the nutritional problems of the State.

Determination of Resources. The principal nutritional needs in the State having been listed, the resources available within the State for meeting these needs should be catalogued. These resources, of course, include not only those available within the nutrition unit of the State health department, but also those found in other official and voluntary agencies, professional groups, and lay organizations.

On the basis of a careful consideration of needs, and resources at hand for meeting these needs, the director of the nutrition unit of the State health department assigns priorities to the various activities his division is staffed to undertake, formulates long-term and short-term goals, and plans for an expanded program when additional funds and personnel shall become available. Other factors which help determine the emphasis an activity receives in his program are listed below.

Cooperation With Other Agencies. A study of the nutritional components of programs of other agencies and professional groups, together with a consideration of the proper role of the State health agency, will lead to a selection of areas in the total nutrition program in which the State health department should assume primary responsibilities and other areas in which it should assist and strengthen the work undertaken by others. Through its knowledge of the health problems resulting from malnutrition within the State, the nutrition unit of the State health department may from time to time stimulate other agencies to broaden or strengthen those services which contribute to nutritional betterment. Unnecessary duplication is, of course, to be avoided and funds and personnel wisely utilized to produce the greatest benefit to all in cooperation with other agencies and professions.

Integration of the Health Department Program. Many of the services of the nutrition unit bear a close relationship to, and indeed are integral parts of, the programs of the various other divisions of the State health department. Cooperative planning and action in these areas of mutual interest will do much to strengthen the programs of all divisions concerned. Divisions of the health department whose programs have a nutritional component include, among others, the maternal and child health division, tuberculosis control, industrial hygiene, school health, dental health, and medical rehabilitation. Important health services with a nutritional component are provided by the divisions of public health nursing and of health education.

Indirect or Consultatory Service versus Direct Service. In planning the program of the nutrition unit of the health department, it will be necessary to decide the extent to which indirect or consultatory service will receive precedence and the extent to which direct service may be offered. Some of the factors entering into this decision may be briefly outlined.

Indirect or consultatory services conserve the time of the personnel of the nutrition unit and enable assistance to be offered on a much wider scale than would be possible if direct services were offered with limited personnel. Since they insure maximal use of the professional abilities of those in the nutrition unit, indirect services ordinarily receive precedence over direct. Numerous examples of indirect services have been included under program content. Such examples might be cited as professional education, in-service training of the personnel of the health department and other State agencies, educators, physicians, and other professional personnel; and the offering of consultatory services to governmental and voluntary agencies, health educators, legislators, educational institutions, hospitals, and industries.

Although direct service is more expensive in terms of personnel time, a limited amount of direct service can often be justified in planning the activities of the nutrition unit. Programs for professional education and in-service training, for instance, usually necessitate some direct service on an instructional basis. Early in the development of the program of the nutrition unit more direct service may be offered than would later be the case, in order to demonstrate to other agencies and professional groups the work of the nutrition unit and the importance of including nutritional services in their programs. Also, direct service may be involved in the development and evaluation of new methods for nutritional improvement.

Production of Lasting Results. In assigning priorities, emphasis should be placed on those efforts of the nutrition unit which are most likely to produce lasting results in terms of broader programs with increased nutritional content. When assistance is offered to other agencies and professional groups, attention should be paid to the likelihood that a lasting nutritional service will be stimulated by the consultation, demonstration, and staff education supplied by the nutrition unit. Such services should increase the number of professional workers trained in nutrition and may lead to the establishment of new staff positions for nutritionists.

Periodic evaluation of the nutrition program of the State health department is essential to success and often results in changes in program emphasis. Such an evaluation should include a restudy of the nutritional needs of the State and its resources for meeting these needs. The role the health department should play in the over-all nutrition program of the State should be reviewed, as well as the place of the nutrition unit in the programs of the health agency and the previously established long-term and short-term goals of attainment for the nutrition unit. Also to be considered are newer knowledge gained from research, and the content and success of nutrition programs offered by other State health agencies.

Studies and Research. Finally, some provision should be made for carrying out studies and research in the field of nutrition. Such investigations may be stimulated by the nutrition unit on the basis of its knowledge of the health and nutritional problems of the State, and can often be undertaken on a cooperative basis with universities, medical schools, schools of public health, and other agencies. Research activities not only advance knowledge of the application of nutrition to public health, but also improve the quality of the services offered by the nutrition unit, enhance its professional standing, and provide a valuable stimulus to staff education and development.

Enough has been said to demonstrate that there are no simple rules to assist in the planning of the program of the nutrition unit of the State health department and in the assigning of priorities of importance and order to its various activities. The director of the nutrition unit must bring to his task not only a broad knowledge of the sciences of nutrition and public health, but also administrative ability and a mature judgment. To be successful, his program must be geared to needs and resources and must change in emphasis with changing demands.

Basic Program

It has been emphasized that the program of the nutrition unit of the State health department should be planned in the light of the needs and resources existing within the State. Model programs can at best serve only as guides in individual States, and the priorities to be attached to various program components will be found to vary from State to State and from time to time. However, if these limitations are borne in mind, it is possible to formulate a basic program for the nutrition unit of a State health department, incorporating those services which would undoubtedly receive a high priority in most State programs. Such a basic program might, with modifications, serve as a starting point in initiating nutrition services in a State health department or might be adopted by a State with limited budget or personnel pending the development of more adequate resources.

Such a basic and limited program for the nutrition unit of a State health department might include:

1. The study of the State's nutritional needs and the resources for meeting these needs, the formulation of a nutrition program for the State health agency, and the demonstration and interpretation of this program to other agencies and professional groups within the State.
2. Assistance in the coordination of nutrition programs within the State through service on State nutrition committees or councils. Collaboration with other agencies in the planning and execution of special projects and programs with a nutritional content.
3. In-service training (staff education) of health and related professional personnel.
4. The preparation, selection, and distribution of educational materials (often in cooperation with the division of health education).
5. The provision of consultatory services in nutrition to the professional personnel of:
    (*a*) The other divisions of the health agency to augment their regular programs.
    (*b*) Other official and voluntary agencies in the fields of education, welfare, agriculture, health, etc., whose programs have nutritional components.
6. The provision of direct services. (Usually limited to those instances in which direct services contribute to demonstration or staff education.)

A Concept of the Physician's Role in Public Health Nutrition

The previous discussions of the evolution of nutrition services and the nutrition activities of State health departments show very clearly the need for personnel with special skills. Chemists and sanitarians were essential for the control of food and its environment. Then nutritionists under medical direction brought about the first public health application of the importance of diet and the early discoveries of certain essential nutrients. Biochemists have developed and refined techniques for the determination of amounts and kinds of various essential nutrients in food and in body fluid. The physician recognizes many nutritional deficiencies through their clinical manifestations. The implications of these deficiencies in both health and disease have brought further realization of the universal importance of nutrition as a medical and a public health problem. There are, then, certain areas of activity for persons with different skills.

A physician with thorough training in both public health administration and clinical nutrition is preeminently qualified to be the director of the nutrition unit in a State health department. He is in a position to best administer, direct, coordinate, and interpret the many and varied activities of a nutrition unit. The physician as director also adds prestige to the unit. Until recently the director has usually been a nonmedical nutritionist for a number of reasons, among which has been the scarcity of physicians trained in nutrition. It must be remembered that in the division of responsibility for carrying out a nutrition program there are some responsibilities that are inevitably those of the administrator and others exclusively those of the physician.

The director administers the unit and plans, develops, and executes policies relating to the nutrition programs. He would collaborate with other official and nonofficial agencies where their policy and planning have a bearing on the nutrition of the people. He would cooperate with all agencies working in nutrition to promote a complete nutrition program of maximum efficiency. He may recommend legislation to carry out programs to improve the nutritional status of the population. He would direct both horizontal and longitudinal epidemiological studies of the nutritional status of population groups to provide information on the prevalence of malnutrition and its causes. He would also direct studies of dietary intake and food habits. These broad approaches provide him with opportunities for the perfection of diagnostic techniques and the development of methods for the application of the science of nutrition to various population segments and clinical conditions, and for the evaluation of preventive and therapeutic measures and professional education.

Any progressive program of nutrition in a State health department should include research studies based on local problems. Such studies may be initiated under health department auspices or in cooperation with either official or voluntary State agencies. Ordinarily, public health departments are fully occupied with preventive services and many urgent problems requiring intensive application of educational measures, leaving little opportunity for basic studies. But opportunities for applied nutrition research are unlimited. During the routine course of clinical and dietary studies, the prevalence of certain deficiencies may be found confined to certain areas, communities, or sections of the population. Such findings offer valuable opportunities for experimental therapy in a natural background. There are many diseases of both known and unknown etiology which, under closer study, may be found to be influenced by nutritional factors. Studies of selected diseases under different dietary conditions should form another promising avenue for research in nutrition by State health departments.

The director may promote and supervise special nutrition clinics which may serve the dual function of clinical research and consultation services.

The medical director is responsible for supervising the work of other physicians on survey teams or those working in nutrition clinics. In smaller States and in the beginnings of programs in larger States, the medical director of the nutrition program may double as the physician in the survey team and as the physician in the clinic research program. He also gives medical nutrition consultation to practicing physicians and institutions. He shows the physicians how to incorporate into their customary physical examinations the search for signs of nutrition deficiency. He promotes and guides nutrition training of personnel in public health activities, as well as of graduate and undergraduate personnel in medical and other professional schools, if so requested.

The director represents the unit, explains its purpose and activities to nonofficial agencies, academic institutions, and lay groups, and helps them set up effective nutrition programs. He promotes and guides public education in nutrition and checks for nutritional and medical accuracy all educational material released by his and other health department divisions and units. He keeps abreast of and interprets the latest advances in the field of human nutrition and determines their applicability to public health activities. Through his direction of the in-service training of his division staff, public health doctors, nurses, and others, the health department personnel in their turn are kept advised of latest developments in nutrition. This is of the greatest importance, as they can be most useful in carrying the knowledge and practice of nutrition further into the community.

It should be emphasized that formal training of personnel in a nutrition unit begins with the education of the physician who heads it if he is not already well trained in nutrition and public health. It is consistent with public health policy to employ a suitable physician with experience and aptitude and provide him with what further training he may require. The increased interest in nutrition shown by schools of public health is encouraging; State health departments should take advantage of it.

Nutrition is essentially a process of the body in which many internal and external environmental factors play varying roles at different times. Diet supports nutrition, and food intake is recorded to provide information on one of the causes of deficiency states and to furnish data for dietary education.

Chemical estimations of nutrients in blood or urine generally reflect recent food intake. By themselves, however, such chemical estimations appear to be insufficient to interpret either the findings of clinicians or the symptoms of patients. Clinical examination for signs of deficiency diseases provides evidence of past and present nutrition and is essential if we are to evaluate the nutritional status of a population or an individual.

The work of the clinician in public health nutrition programs involves the collection of data pertaining to the prevalence and severity of the various manifestations of deficiency disease and their relation to internal and external environmental factors. Population samples chosen for appraisal should be selected and the data analyzed by statistical methods.

Clinical appraisal must be done by a physician trained in the science of nutrition. Clinical examinations should be comprehensive, with special emphasis on the tissues and systems which ordinarily are most likely to show pathological lesions in malnutrition.[3]

Careful and accurate recording of all relevant signs and symptoms will aid in assessing the present nutritional status and also in following its progress from time to time, with or without therapy.

In general, criteria for nutritional evaluation should be sufficiently gross to be easily adopted by any examining physician. They should be clearly defined and the procedures lucidly described. Diagnostic signs which are most useful in general nutrition studies are those which most promptly and uniformly regress under therapy or progress in the absence of therapy. More sensitive methods and criteria should also be provided for use in intensive studies of early or mild deficiency states where diagnosis is difficult.

Among chemical tests that may be used, the determination of hemoglobin is an important one which should be made routine in field studies. The preferred technique permits direct reading of the hemoglobin. Red cell counts and hematocrits should be done when indicated.[4]

The results of clinical assessment must be studied in the light of many contributing environmental factors. These must be analyzed thoroughly to incriminate those responsible and to organize effective ameliorative and preventive measures. The most vulnerable factors may not necessarily be the most important, but they may well be the straw breaking the camel's back. The external factors concerned in human nutrition include the prevailing dietary practices of population groups and the social and economic conditions which induce or control these practices. The internal factors concern the fate of nutrients in the body and the body functions and reactions in general.

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[3] Nutrition surveys: Their techniques and value. National Research Council Bulletin No. 117, May 1949.

[4] Refer to Bulletin on Nutrition Surveys for details of other tests.

Internal factors having an important bearing on nutritional status include body functions such as growth, pregnancy, lactation, and special situations arising from infections and toxic or chronic and debilitating diseases. Body reactions such as interference with ingestion, absorption, and utilization, increased excretion or destruction of particular nutrients in the body, and some of the causes of increased requirements, must also be considered.

Information in respect to some of the external factors may be obtained from other departments and agencies. However, dietary data collected by a carefully organized survey of a population group remain most important. Such surveys may be carried out as a basis for diet education programs independent of clinical assessment. Methods designed to detect significant differences in individual diets are not generally practical or necessary, although they may be required in special studies.

There has been considerable emphasis placed on the physician's role as director of the nutrition program in State health departments. It must be remembered that the work of the nutritionist is an essential part of a nutrition program complementing that of the physician and that the cooperation of the biochemist broadens the scope and versatility of the program.

Role of the Nutritionist in a State Health Department

The nutritionist has had a most important role in the development of nutrition programs in State health departments and, until recently, has often been the only person on the health department staff with special training in nutrition. She has often had to initiate the program and then carry it out singlehandedly. Her activities have been many and varied, dependent in large part on the administrative unit to which she was attached and the problems which were paramount in this unit, as well as on changing trends in the public health field.

The nutritionist in public health is concerned with the phase of preventive medicine that deals with the kind and amounts of food necessary for an adequate diet and the maintenance of nutritional health. In the phase of public health nutrition which deals with the detection of nutritional inadequacy and the planning of preventive and curative measures for such, the nutritionist is concerned with evaluation of the dietary intake of populations or groups and the changes in the dietary pattern necessary to prevent the recurrence of nutritional disease.

In recent years the responsibilities and duties of the public health nutritionist have been clarified, and qualifications have been defined for positions of several grades of responsibility by the Committee on Professional Education of the American Public Health Association.[5] Activities continue to be greatly influenced by the personnel, money, and facilities which are available in the health department, as well as by the administrative assignment.

The director of the nutrition unit in a State health department should, ideally, be a physician trained in public health nutrition, but, because of budgetary limitations and shortage of trained personnel, it will be many years before this goal can be generally attained. In many areas, a nonmedical nutritionist will be in charge of the program and may, in the smallest States, be the sole person in the nutrition unit. The qualifications for such a nutritionist should be approximately as follows: 5 years, within the past 10 years, of experience in public health nutrition, including research projects, 2 years of which shall have included broad administrative responsibilities, and graduation from a recognized college or university with major work in foods and nutrition supplemented by 1 year of graduate work in nutrition.

The position is a highly responsible one and involves "development, direction, integration, evaluation and administration of food and nutrition programs throughout the State" under the general direction of the State health officer or someone deputized by him. The duties include formulation of plans and policies, coordination within the State health department, cooperation with related agencies, guidance of in-service training programs, consultant and information services, and supervision of public health nutritionists of lower administrative levels. The nutritionist must have "Extensive technical knowledge of the principles and practices of dietetics and nutrition and ability to interpret and apply them as related to public health, community, individual and family food problems and ability to develop and coordinate educational activities at the State level."

Especially when a nonmedical nutritionist is responsible for the nutrition program in a State health department, resourcefulness is needed in order to obtain the information and assistance necessary for delineation of existing problems and for carrying out a program to meet these problems. Interest must be stimulated in professional and lay groups and cooperative work undertaken. Assistance may often be obtained from colleges, medical schools, and other training centers in the State, and from various State and voluntary agencies. The nutritionist may undertake dietary surveys in cooperation with some of the groups noted. Such surveys, carefully planned and executed, stimulate interest in nutrition and are a good starting point for interagency cooperation. Often long-range plans can emerge

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[5] American Journal of Public Health, 36: 15-50, January 1946.

from this beginning. If physicians trained in nutrition are practicing in the community or in a nearby medical school, their cooperation may be solicited on a voluntary or part-time basis and clinical appraisal of nutritional status carried out in selected population segments.

The nutritionist can stimulate interest in the formation of a State nutrition committee or council and may serve on this council. She can represent the health department at conferences and meetings in which there is a nutritional component. One of her chief duties is developing among the personnel of the State health department itself an awareness of nutrition problems and of interrelationships with other aspects of the public health program. The head of the nutrition staff has a definite responsibility for recruiting as well as training personnel. Administrative duties increase as new workers are added to the unit and as the program expands.

The nutritionist should keep in close touch with national programs and obtain literature and other visual aids as they become available. National plans may be adapted to State needsand all material evaluated in the light of the State program. It is incumbent upon the nutrition staff to keep up with the advances in the field of nutrition. Participation in professional groups at the national level will be of great assistance in this respect.

The work of the nutritionist is complementary to that of the physician, whether he be director of the nutrition unit or a physician in charge of other public health programs. Certain aspects of the program are particularly the responsibility of the nutritionist. These include fact-finding in regard to dietary habits, methods of cookery, production and availability of foods, budgeting and meal planning, and administration of quantity food service. She will also be concerned with preparation and evaluation of educational materials, demonstrations, and dietary consultation. She assists in program planning and in supervising research. She contributes to the in-service training program in many ways, through personal contacts, written material, staff meetings, conferences, regional meetings, and formal courses. Some health departments have a training center with teaching facilities for formal classes and supervised field experience. Training may also be carried out in selected areas of the State in regularly scheduled clinics or conferences, or in specially planned workshops and institutes. One of the nutritionist's important responsibilities is the training of the public health workers in nutrition. The assistance and cooperation of the public health nurse and health educator is of vital importance in any effective nutrition program.

The nutritionist has an important role in the coordination of nutrition activities within the health department and in cooperating with other official and nonofficial agencies. An example of intra-agency coordination would be in the preparation of a visual aid or a pamphlet for distribution. If the material concerned a diet in pregnancy, the groups involved would include the maternal and child health unit, the obstetrical consultant, the public health nursing unit, the health educator, and perhaps the artist and editorial assistant. When planning nutrition programs with other groups, one should have long-range goals, but there should also be some immediate purposes that are easy to accomplish in order to get group experience in cooperation.

Where money and organization permit, there will often be regional nutritionists assigned to work in designated areas, in addition to the physician and/or chief nutritionist in the State nutrition unit. The regional nutritionist will be on an organization level with regional public health nurses, sanitarians, and other consultants. The regional nutritionist receives guidance from the head of the State unit in adapting the State program to her region and is available for consultation to the local health units in her area. She gives professional guidance to nutritionists who function in the local health units. In areas where no local nutritionists are available, she assists the local units in program planning, prepares informational material, talks, etc., and sponsors local nutrition committees and cooperative work among local agencies. She may participate in planning basic training and in-service education for nurses, teachers, social workers, and other professional groups.

She will provide few direct services except where these services are in the nature of a demonstration to public health nurses or others. A nutritionist who takes a public nurse, a welfare worker, and a county agent in home economics into a grocery store to demonstrate better buying practices gives each agency worker much to pass on to the people with whom she is concerned. A demonstration of the use of dried skim milk to a group of lunchroom managers may indirectly benefit hundreds of children.

Where the nutrition unit consists of only one person, a combination of the duties of head of the unit, regional nutritionist, and, at times, even local nutritionist becomes a necessity, and one must do everything from serving on State committees to helping in a local health unit.

In some organizations, special consultants are included in the nutrition unit in addition to the physician, chief nutritionist, and regional nutritionists. Such consultants serve on a state-wide basis and are responsible to the head of the nutrition unit and to the group served. A consultant in institutional management or hospital dietetics, or an industrial consultant, are examples of the type of specialist that may be desirable in certain States.

The administrative location of the nutrition unit influences the work of the nutritionist, especially in the beginning of the program.

For example, if the nutrition unit begins as a part of the maternal and child health program, work in this field will be predominant at first; if the unit is placed in the division of preventive medicine, which includes industrial hygiene as well as nutrition, work with industry will develop early in the program. In all events, the nutrition group should envisage a broad program that will cross many lines in the administrative set-up.

Whatever the State nutrition program, there will always be a need to interpret to individuals the conditions which have been uncovered and ways to better these conditions; to motivate individuals to desire to eat the proper foods and to learn how to achieve good nutrition within existing financial and environmental limitations. This makes the nutritionist's job a very personal one, but one which, in most instances, will be accomplished indirectly by motivating and training other workers, such as the public health nurse, the elementary and high-school teacher, the welfare worker who visits the home, and the volunteer worker, to help individual people to better their own nutrition.

It is of particular importance that the nutrition program of the State health department be closely geared to nutrition activities of the extension service and of the departments of agriculture and education, on both State and local levels, so that there will be no overlapping, fewer gaps, and better use of available resources. This involves continuous interagency planning and evaluation.

Organization of Nutrition Programs in State Health Departments

There has been a growing appreciation of the need for an organization in State health departments to deal adequately with nutrition problems in the State. At the present time, most State health departments have personnel devoting part time or full time in this field. The organization of this activity varies greatly from State to State. In some instances, it is confined to one nutritionist assigned to a special phase of a division's program, while in others it has assumed divisional or bureau status comparable to that for other major activities.

The several States vary widely in population, area, wealth, and nutritional problems. Furthermore, the basic structure of administration and operation varies between States. Therefore, it is not practical, nor it is desirable, to suggest a rigid pattern of organization which would be generally applicable in all instances. It is possible, however, to envisage a framework of organization within which most States can develop and operate a satisfactory program.

In each State, there should be established in the framework of the health department a separate unit corresponding to a major organizational subdivision. Such a unit would assume responsibility for initiating and directing programs appropriate to deal with nutrition problems in the State. The unit approach would enable the health department to define the needs and evaluate the efforts to meet them. Such a unit approach would more likely assure a coordinated program throughout the department.

A public health program for nutrition evaluation and improvement should include a combination medical, dietary, and biochemical approach. Within the staff, therefore, there should be included a physician, trained in nutrition and public health; a chief nutritionist; regional nutrition consultants as needed; one or more consultant dietitians for institutions, and either a biochemist or assurance of availability of adequate services from a laboratory equipped to perform the necessary biochemical tests. There should also be arrangements for consultation and services as required from health education specialists and statisticians.

Where practicable, a nutrition epidemiological field team consisting of a physician, nutritionist, nurse, and technicians should be organized for carrying on investigations, surveys, and demonstrations.

In States where there is decentralization of administration through district or regional offices, nutrition consultants should be assigned to work under the district or regional director, with technical direction from the central staff.

In States which do not have the resources to permit the employment of qualified nutrition personnel for complete staffing of the nutrition unit on a full-time basis, other arrangements for services and consultation should be made. The nutrition program may be greatly assisted by working closely with nutrition committees, councils, professional schools, other State department groups, interested civic organizations, and business and professional associations. It is essential, however, that responsibility for direction and operation of nutritional activities be vested in a person high in the organizational structure of the State health department. He should be able to discuss nutritional problems, their application to different fields, and their relationships to over-all policy on an equal professional footing with other policy-making staff members. The operations should be carried on as a unit activity with close coordination with other units, since nutrition problems are inherent in most health department activities. In certain programs, it may be desirable to assign such personnel to other major divisions or even other State departments, such as those responsible for institutional care. However, in these instances, such personnel should receive their technical direction from the director of the nutrition unit.

SUBCOMMITTEE MEMBERS

The members of the subcommittee of the Committee on Diagnosis and Pathology of Nutritional Deficiencies are Grace Goldsmith, M. D., Associate Professor of Medicine, School of Medicine, Tulane University of Louisiana, New Orleans, La.; Gaylord Anderson, M. D., School of Public Health, The Medical School, University of Minnesota, Minneapolis, Minn.; John Browe, M. D., New York State Department of Health, Albany, N. Y.; A. Hughes Bryan, M. D., Professor of Public Health Nutrition, School of Public Health, University of North Carolina, Chapel Hill, N. C.; Miss Marjorie Heseltine, Nutrition Unit Director, Children's Bureau, Federal Security Agency, Washington, D. C.; Herman E. Hilleboe, M. D., Commissioner of Health, State Department of Health, Albany, N. Y.; Harold R. Sandstead, M. D., Chief, Nutrition Branch, Division of Chronic Disease, Public Health Service, Washington, D. C.; Miss Jane Sedgwick, State Department of Corrections, 417–429 State Office Building No. 1, Sacramento 14, Calif.; Miss Dorothy G. Wiehl, Milbank Memorial Fund, 40 Wall Street, New York, N. Y. In addition, recognition of the assistance given the chairman by Miss Margaret Moore, Consultant on Nutrition, State Department of Health, New Orleans, La., is recorded gratefully.

Notifiable Diseases, Fourth Quarter, 1949[1]

The figures in the following table are the totals of the monthly morbidity reports received from State health authorities for October, November, and December 1949. They are provisional and are subject to correction by final reports. They may be assumed to represent the civilian population only, although in some instances a few cases in the military population may be included. The comparisons made are with similar provisional reports; but owing to population shifts in many States since the 1940 census, the figures for some States may not be comparable with those for prior years, especially for certain diseases. Each State health officer has been requested to include in the monthly report for his State all diseases that are required by law or regulation to be reported in the State, although some do not do so. The list of diseases required to be reported is not the same for each State. Only a few of the common communicable diseases are notifiable in all the States. In some instances, cases are reported in some States of diseases that are not required by law or regulation to be reported, and the figures are included although manifestly incomplete. There are also variations among the States in the degree of, and checks on, the completeness of reporting of cases of the notifiable diseases; therefore, comparisons between States may not be justified for certain diseases. As compared with the deaths, incomplete case reports are obvious for such diseases as malaria, pellagra, pneumonia, and tuberculosis, while in many States other diseases, such as cancer, puerperal septicemia, rheumatic fever, and Vincent's infection, are not reportable. However, the figures are recorded as reported.

The table gives a general picture of the geographic distribution of certain diseases, as the States are arranged by geographic areas.

Leaders are used in the table to indicate that no case of the disease was reported.

Consolidated Monthly State Morbidity Reports for October, November, and December 1949

Division and State	Anthrax	Chickenpox	Conjunctivitis [2]	Diphtheria*	Dysentery, amebic	Dysentery, bacillary	Dysentery, undefined	Encephalitis, infectious	German measles	Hook worm disease	Influenza	Malaria [3]	Measles*	Meningitis, meningococcal*	Mumps	Ophthalmia neonatorum	Pellagra	Pneumonia, all forms
NEW ENGLAND																		
Maine	--------	536	--------	1	--------	--------	--------	--------	104	--------	2	--------	443	6	816	--------	--------	209
New Hampshire	--------	191	--------	--------	--------	--------	--------	--------	9	--------	5	--------	15	1	94	--------	--------	46
Vermont	--------	1,056	1	--------	--------	--------	--------	1	50	--------	--------	--------	49	--------	890	--------	--------	1
Massachusetts	--------	2,688	--------	52	--------	36	--------	8	110	--------	--------	3	361	14	1,162	31	--------	--------
Rhode Island	--------	334	--------	--------	--------	8	--------	--------	--------	--------	2	--------	28	1	374	--------	--------	61
Connecticut	--------	743	1	5	1	16	--------	2	44	--------	2	--------	191	17	537	1	--------	502
MIDDLE ATLANTIC																		
New York	2	3.273	4	80	260	187	--------	11	168	29	[4] 15	11	1,059	53	1.332	7	--------	2,657
New Jersey	1	2,925	--------	17	17	4	--------	4	161	--------	50	6	1,134	21	654	2	--------	861
Pennsylvania	4	4,091	--------	46	4	5	--------	3	112	--------	18	--------	658	75	2,769	7	--------	815
EAST NORTH CENTRAL																		
Ohio	--------	2,405	1	91	20	7	10	1	97	1	24	--------	277	46	1,259	159	--------	717
Indiana	--------	448	--------	105	4	2	--------	8	101	--------	64	1	290	15	261	--------	--------	92
Illinois	--------	2.092	40	9	132	48	--------	14	103	--------	21	10	372	50	1,377	47	--------	1,001
Michigan	--------	3,330	64	29	128	184	--------	15	235	12	11	1	3,362	39	1,093	5	--------	448
Wisconsin	--------	4,305	--------	7	--------	--------	--------	1	176	--------	120	1	713	10	1,470	--------	--------	97

WEST NORTH CENTRAL																		
Minnesota	--------	703	--------	35	4	55	1	1	--------	--------	4	1	549	14	--------	--------	--------	119
Iowa	--------	501	--------	13	2	--------	--------	2	1	--------	--------	--------	659	12	378	--------	--------	11
Missouri	--------	362	--------	40	--------	--------	8	--------	--------	--------	16	--------	43	20	158	--------	--------	181
North Dakota	--------	326	--------	12	1	2	--------	25	--------	--------	99	--------	283	1	--------	--------	--------	193
South Dakota	--------	203	8	5	--------	--------	--------	11	--------	--------	--------	--------	73	3	26	--------	--------	7
Nebraska	--------	667	--------	6	--------	--------	--------	1	--------	--------	121	--------	132	2	290	--------	--------	31
Kansas	--------	1, 167	5	12	1	--------	--------	6	11	--------	44	--------	47	8	2, 068	--------	1	249
SOUTH ATLANTIC																		
Delaware	--------	24	--------	2	--------	--------	2	--------	--------	--------	--------	--------	45	8	4	--------	--------	6
Maryland	--------	593	--------	27	2	6	--------	2	14	--------	13	1	160	4	155	2	--------	432
District of Columbia	--------	71	--------	14	3	13	--------	--------	--------	--------	--------	--------	225	2	315	--------	--------	156
Virginia	--------	503	--------	114	2	--------	969	1	--------	--------	2, 441	5	117	11	187	--------	--------	701
West Virginia	--------	278	10	82	--------	3	1	--------	23	--------	379	--------	442	20	117	--------	--------	86
North Carolina	--------	--------	--------	275	48	18	--------	2	--------	--------	--------	7	455	21	--------	--------	--------	--------
South Carolina	--------	--------	--------	152	3	8	--------	--------	--------	--------	204	30	127	7	--------	1	--------	161
Georgia	--------	184	28	225	19	29	5	2	--------	907	545	11	68	12	183	--------	26	440
Florida	--------	156	23	56	28	12	--------	1	4	2, 256	72	6	79	7	443	2	--------	179
EAST SOUTH CENTRAL																		
Kentucky	--------	228	--------	142	10	13	--------	--------	10	10	12	2	131	36	114	--------	--------	233
Tennessee	--------	238	1	163	23	33	7	3	13	3	271	7	205	36	199	2	4	605
Alabama	--------	236	--------	146	6	--------	--------	2	2	--------	369	29	123	23	141	--------	8	521
Mississippi	--------	--------	--------	143	20	11	--------	--------	--------	854	--------	11	157	13	--------	9	--------	258
WEST SOUTH CENTRAL																		
Arkansas	--------	327	--------	75	55	13	57	--------	1	2	777	24	57	15	129	1	1	431
Louisiana	--------	62	--------	82	126	2	--------	--------	1	220	16	1	43	9	29	1	2	292
Oklahoma	--------	395	--------	59	24	5	21	8	12	8	736	15	52	16	353	1	2	288
Texas	--------	2, 373	--------	304	174	5, 772	5, 472	23	--------	--------	--------	429	450	73	3, 027	42	--------	3, 638
MOUNTAIN																		
Montana	--------	1, 229	16	9	1	--------	2	1	41	--------	30	--------	548	3	327	--------	--------	7
Idaho	--------	557	27	7	--------	--------	10	1	31	--------	203	--------	65	4	48	--------	--------	103
Wyoming	--------	142	1	2	--------	--------	--------	--------	24	--------	--------	--------	55	3	111	--------	--------	29
Colorado	--------	802	--------	18	2	67	--------	8	35	--------	203	2	274	13	257	--------	--------	177
New Mexico	3	172	--------	5	9	21	25	--------	10	--------	3	1	246	2	121	1	--------	93
Arizona	--------	424	--------	25	42	253	25	--------	78	--------	1, 215	5	412	6	473	--------	--------	147
Utah	--------	1, 203	--------	9	25	1	1	1	29	--------	10	--------	802	3	250	--------	--------	21
Nevada	--------	29	25	1	--------	--------	7	--------	--------	--------	82	1	15	4	29	--------	--------	13
PACIFIC																		
Washington	--------	2, 335	89	10	16	12	48	2	179	--------	72	--------	1, 007	13	476	--------	--------	167
Oregon	--------	1, 140	12	34	10	5	6	--------	--------	--------	--------	--------	249	6	459	--------	--------	229
California	4	4, 058	--------	112	82	181	--------	20	494	--------	103	6	772	59	5, 421	5	--------	387
Total	14	50, 105	357	2. 858	1, 304	7, 032	6, 677	191	2, 483	4, 302	8, 434	627	18. 170	837	30, 376	326	44	18, 098
Fourth quarter 1948	11	67, 358	322	3, 369	1, 254	7, 353	5, 489	117	2, 616	4, 202	13, 115	1, 626	49, 928	787	25, 261	314	133	15, 671
Median 1944-48	11	61, 310	322	4, 922	888	5, 898	2, 143	135	2, 316	3, 812	38, 519	6, 694	25, 449	840	25, 261	354	708	21, 730
Alaska	--------	90	--------	--------	--------	--------	--------	--------	26	--------	7	--------	531	--------	160	--------	--------	15
Hawaii Territory	--------	299	20	1	2	24	--------	--------	12	--------	2, 807	22	17	1	153	--------	--------	9
Panama Canal Zone [5]	--------	48	--------	15	18	10	--------	--------	--------	--------	--------	192	72	1	59	--------	--------	74

See footnotes on page 450.

Consolidated Monthly State Morbidity Reports for October, November, and December, 1949—Continued

Division and State	Polio-myelitis*	Rabies in man	Rheumatic fever	Rocky Mt. spotted fever	Scarlet fever*	Septic sore throat	Small-pox*	Tetanus	Trachoma	Trichinosis	Tuberculosis, all forms*	Tuberculosis, respiratory	Tularemia	Typhoid fever*	Paratyphoid fever [6]	Typhus fever, endemic	Undulant fever*	Vincent's infection	Whooping cough*
NEW ENGLAND																			
Maine	82		2		88	7					100	92		7			5		105
New Hampshire	26				45	11				2	43								125
Vermont	49				39	3													110
Massachusetts	339				617	16		2	1	9	605	579		4	30		4		1,301
Rhode Island	60		16		77	4					114	101		1			1	1	140
Connecticut	214				128	34		1		3	326	309		2	2		5		1,032
MIDDLE ATLANTIC																			
New York	1,156			1	[7] 736	(8)		10		26	3,136	2,923	3	26	20		29		2,629
New Jersey	415				258	15		1		4	608			7	1	1	5		1,990
Pennsylvania	294		172		593			4		1	1,062		2	46	10		19		2,309
EAST NORTH CENTRAL																			
Ohio	357		23		1,628	25		1		1			14	18	3		8	5	1,192
Indiana	286				395	6		3	2		538	498	7	9	4		7	11	263
Illinois	474		37		439	8		9	4		2,114	1,987	29	24			114	34	1,197
Michigan	630		136		921	95		3		7	1,703		5	12	35		47		1,912
Wisconsin	295				475	22					462			6			51		1,387
WEST NORTH CENTRAL																			
Minnesota	337		13		268	18					437			3	7		43		98
Iowa	336				163	8				10	202			3	3		57		48
Missouri	217				152	1			143		640		17	43			19		140
North Dakota	27		3		45						66	62		1			8	15	23
South Dakota	95				31	4			1		69			1			14		21
Nebraska	188		1		[7] 133	(8)					70			1			7		41
Kansas	152		3		218	5	2	4	3		133	90	2	4	2		41	75	162
SOUTH ATLANTIC																			
Delaware	8		1		33						69	69		5					128
Maryland	99		28		201	8		6			671	647	7	7		1	11	4	592
District of Columbia	28				57									6	5				32
Virginia	89		2	4	347	542		1	1		1,010	992	12	34	10		17		320
West Virginia	50	1	6		215	44					645	641	6	19	2		3		341
North Carolina	52			7	1,086	13	1				711	673	7	11	1	4	6		321
South Carolina	23		12		119	21		4						17	1	5	5		46
Georgia	77		22	3	328	77		12			689	673	34	5	5	50	19	7	78
Florida	87				89	25		10			632		7	9	43	37	19	27	29

EAST SOUTH CENTRAL																			
Kentucky	180		9	1	665	25		1	9		506	306	4	26				1	159
Tennessee	126		27	2	724	52		9	7		1, 544		11	24	5	8	11	21	310
Alabama	55			3	297			8			575		2	5	3	43	24		92
Mississippi	72		18		132			5			555	544	4	14		3	16		50
WEST SOUTH CENTRAL																			
Arkansas	123		1		57	341		4	30		519	517	22	19	1	4	3		170
Louisiana	33		5		46	3		10			490	464	6	14	4	20	7		33
Oklahoma	270		13	6	128	65		1	17		511	503	13	14	2		32	42	72
Texas	464				324	1, 302			13		1, 143		13	53	15	52	53		966
MOUNTAIN																			
Montana	26				95	21					112	107	18	2			5	2	18
Idaho	135		6	1	74	164		1			31			2			5	21	23
Wyoming	31		1		39						16	12	5	1	1		2	3	24
Colorado	147		19		105	109					763			10	4		26	29	97
New Mexico	55		13	2	63	6			8		[9] 289	[9] 277	1	14	1		2		90
Arizona	35		25		68	448	2	2	10		680	647	1	11	3		2		167
Utah [9]	108		7		54				1		87	82	6	1	1		10		125
Nevada	12				5	41			3		8						2	8	15
PACIFIC																			
Washington	134		79		532	40			1		508			1	11		4	43	256
Oregon	149		17	1	187	61		1			181	164		2			29		181
California	857		69		991	140		10	1	6	2, 069	1, 944	2	30	100	9	30		1, 261
Total	9, 554	1	786	31	14, 510	3, 830	5	123	255	69	27, 532	15, 903	260	574	335	237	827	349	22, 230
Fourth quarter 1948	9, 012	7	1, 085	35	19, 522	4, 671	7	144	643	78	31, 847	17, 308	304	710	327	317	986	269	10, 349
Median 1944-48	4, 606	7	[10] 1, 021	35	22, 862	3, 634	43	108	443	77	29, 976	17, 272	282	717	272	693	1, 262	560	26, 205
Alaska	1		6		4	36							1						4
Hawaii Territory	1		2		7	3		1	1		54	7		1		5	2		4
Panama Canal Zone	2							2			8			6	4	1	1		25

See footnotes on page 450.

Footnotes for table on pages 446 to 449

*On the basis of information in the latest compilation of the reportable diseases in the several States (Pub. Health Rep. 59:317–340 (1944) Reprint 2544), diseases marked with an (*) are reportable by law or regulation in all States and the District of Columbia. Typhoid fever is reportable in all States, and paratyphoid fever in all but 6 States. A few States have begun to report paratyphoid fever as "salmonellosis." Syphilis is reportable in all States but is not included in the table, as more complete reports are issued later by the Division of Venereal Disease Control. Some States have increased and some have reduced the list of reportable diseases since the latest compilation cited above.

[1] For first quarter report see Pub. Health Rep. 64: 927 (1949); second quarter, ibid.: p. 1306; third quarter, ibid.: p. 1620.

[2] Includes cases of kerato, suppurative conjunctivitis, and pink eye.

[3] All cases contracted within the continental United States, with the exception of those in a few States.

[4] New York City only.

[5] Includes the cities of Colon and Panama.

[6] Includes cases reported as Salmonella infection.

[7] Includes septic sore throat.

[8] Included in scarlet fever.

[9] Includes nonresident cases.

[10] 3-year median 1946–48.

The following list includes certain rare conditions, diseases of restricted geographical distribution, and those reportable in or reported by only a few States; last year's figures in parentheses (where no figures are given, no cases were reported last year, or the disease was not included in last year's published tabulation).

Actinomycosis: Hawaii 1.

Botulism: New Jersey 3, Kentucky 7, Montana 1.

Cancer: Pennsylvania 2,339, North Dakota 176 (206), Kansas 1,205 (1,194), South Carolina 105 (225), Georgia 70 (55), Florida 2,090 includes 1,480 cases reported in October (not previously reported) obtained from death certificates (428), Kentucky 3 (18), Tennessee 906 (1,019), Alabama 1,183 (896), Arkansas 135 (154), Louisiana 533 (520), Montana 335 (353), Idaho 146 (164), Wyoming 88, Colorado 874, New Mexico 223 (150), Utah 212 (46) includes nonresidents, Nevada 7 (3).

Coccidioidomycosis: Arizona 28 (9), Colorado 22 (18).

Colorado tick fever: Utah 1 nonresident.

Dengue: Georgia 2, Texas 4 (4).

Dermatitis: New Hampshire 4 (1), Missouri 1 (9), New Mexico 8.

Diarrhea: Connecticut 1 (5), New York 158 (70), New Jersey 1, Pennsylvania 73 (120) (includes enteritis), Ohio 524 (340) (includes enteritis), Indiana 1 (1), Illinois 25 (17), Michigan 16 (31) Minnesota 21, Maryland 28 (12), West Virginia 6, South Carolina 41, epidemic (213, all forms), Florida 29 (35), Oklahoma 3 (2), Texas 1,716, Idaho 24 (73) (includes gastroenteritis), New Mexico 109 (95), Colorado 30 (35), Alaska 100 (23) (includes enteritis).

Encephalitis (other forms) Ohio 4 (2), Maryland 1 (4), Montana 1.

Erysipelas: Connecticut 6 (5), Pennsylvania 5, Ohio 8 (3), Indiana 4 (1), Illinois 37 (70) Michigan 21 (28), Wisconsin 9 (11), Minnesota 1, Iowa 3, Missouri 2, North Dakota 4, South Dakota 1 (2), Kansas 1 (1), Maryland 1 (7), Florida 5 (13), Kentucky 1 (3), Tennessee 9 (8), Arkansas 1 (5), Montana 1 (1), Idaho 5 (2), Wyoming 1, New Mexico 2, Utah 1, Nevada 1 (1), Washington 4, Oregon 13 (7).

Favus: Michigan 1.

Food poisoning: Connecticut 11, New York 226 (434), New Jersey 20 (3), Ohio 11 (8), Indiana 4 cases reported as food infection, Illinois 54 (48) includes cases reported as food infection, Minnesota 61 (146) Oklahoma 15, Montana 45, Idaho 1 (2), New Mexico 2 (13), Washington 107 (41), Oregon 11 (11), California 237 (256).

Impetigo contagiosa: Vermont 1 (1), Rhode Island 2 (1), New York 117 (36), Ohio 116 (85), Indiana 8 (10), Illinois 3 (13), Michigan 425 (637), Missouri 13 (32), North Dakota 4 (4), Kansas 11 (17), Kentucky 27 (14), Montana 5 (39), Idaho 42 (21), Wyoming 1 (7), Colorado 26 (8), Nevada 27 (26), Washington 432 (284), Alaska 26 (3), Hawaii 20 (14).

Jaundice: Maine 3 (7), Connecticut 7, New York 81 (52), Pennsylvania 244 (19), Illinois 19 (8), Michigan 16, Minnesota 7 (4), Kansas 1, Maryland 2 (4), Tennessee 14 (2), Louisiana 1 (1), Montana 2, Wyoming 2, Arizona 2 (6), Nevada 1, Washington 4 (2), Oregon 172 (11), California 122 (46), Alaska 1, Hawaii Territory 4 (3), Panama Canal Zone 11 (4).

Leprosy: New York 6 (2), Louisiana 1 (1), California 2 (2), Hawaii 8 (7).

Lymphocytic choriomeningitis: Minnesota 2, Tennessee 3 (3), choriomeningitis undefined.

Mononucleosis: Connecticut 45 (23), Pennsylvania 2, Ohio 1, Michigan 58 (42), Minnesota 90 (69), Maryland 3 (11), Kentucky 4 (7), Tennessee 8 (10), Oklahoma 2, Montana 2, Idaho 3 (1), Arizona 1, Washington 3.

Pellagra: Kansas 1, Georgia 26 (18), Tennessee 4 (4), Alabama 8 (1), Arkansas 1, Louisiana 2 (1), Oklahoma 2 (5).

Plague (human): New Mexico 1, Hawaii 1.

Psittacosis: California 8 (6).

Puerperal septicemia: Pennsylvania 2.

Rabies in animals: New York 198 (143), New Jersey 4, Pennsylvania 5 (27), Ohio 103 (197), Indiana 134 (162), Illinois 102 (18), Michigan 46 (63), Wisconsin 5 (1), Minnesota 4 (1), Iowa 36 (9), Kansas 29 (6), District of Columbia 1, Virginia 21 (29), West Virginia 32, South Carolina 47 (42), Georgia 105 (85), Florida 4 (75), Kentucky 129 (152), Tennessee 26, Alabama 73 (67), Arkansas 20 (22), Louisiana 3 (4), Oklahoma 21 (37), Texas 239 (350), Colorado 9, California 14 (51).

Rat bite fever: Ohio 1 (1), Oklahoma 1.

Relapsing fever: Texas 5 (15), California 4 (1).

Rickettsialpox: New York 33 (31).

Ringworm disease: Connecticut 44 (11), Ohio 174 (36), Indiana 38 (22), Illinois 667 (849), Michigan 568 (546), Minnesota 5 (13), Iowa 51 (18), Missouri 5 (9), Kansas 39 (42), Virginia 99, South Carolina 2, Georgia 35 (35), Florida 1, Kentucky 135 (18), Oklahoma 24, Montana 2 (3), Idaho 41 (17), Utah 110 (10), Nevada 2 (1), Washington 464 (393), Oregon 38 (3), Alaska 5.

Scabies: Pennsylvania 78 (109), Ohio 33 (37), Michigan 248 (383), Missouri 17 (23), North Dakota 10, Kansas 17 (17), Kentucky 76 (38), Montana 7 (43), Idaho 25 (51), Wyoming 5 (9), Nevada 4 (2), Alaska 4 (4).

Schistosomiasis: New York (City) 16 (11).

Silicosis: Idaho 4 (8), New Mexico 3 (4), Utah 3.

Yaws: Panama Canal Zone 9 (11).

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MARCH 11, 1950

For the current week in the Nation, reported cases of influenza increased from 24,705 to 27,045. For the corresponding week last year, 3,948 cases were reported. The 5-year (1945–49) median is 5,532.

The cumulative total is 115,946 as compared with the corresponding total of 45,307 for 1949 and 165,882 for 1946, the highest year during the last 5 years.

Relatively large increases were reported in Iowa (from 35 to 159), South Carolina (from 88 to 389), West Virginia (from 974 to 2,047), and Wisconsin (from 80 to 209).

The reported incidence of influenza increased for the current week over the preceding week in the following geographic divisions: East North Central (126 to 227), South Atlantic (7, 047 to 9,334), and West South Central (12,555 to 13,989). The Pacific Division increased slightly because 42 cases were reported in Oregon as compared with 11 the preceding week. The East South Central and Mountain Divisions decreased, and the remaining divisions showed little change from the previous week.

Reported incidence of meningococcal meningitis totaled 103 for the week as compared with 87 last week, 73 for the corresponding week of 1949, and 90 for the 5-year median. Reported incidence of typhoid and paratyphoid fever increased from 45 to 63 cases, and tularemia from 20 to 30.

The number of reported cases of acute poliomyelitis was 86 for the week as compared with 82 for the preceding week, 65 for the corresponding week last year, and 38 for the 5-year median.

One case of smallpox was reported in South Dakota; two cases of psittacosis were reported in Steubenville, Ohio; and one case each of anthrax was reported in Delaware and Massachusetts.

Of 42 States reporting on rabies in animals, for 22 there were no cases. The remaining 20 States reported 185 cases with the largest number of cases in Texas (47) and New York (19). The cumulative total is 1,473 cases of rabies in animals for the current year.

Telegraphic case reports from State health officers for the week ended March 11, 1950

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	---	---	2	72	1	15	1	---	10	---	---	---	24	---
New Hampshire	---	---	1	1	---	6	---	---	---	---	---	---	9	---
Vermont	---	---	---	22	---	---	---	---	9	---	---	---	25	---
Massachusetts	3	2	---	208	2	---	---	---	149	---	---	1	155	---
Rhode Island	---	---	---	4	1	6	---	---	10	---	---	---	27	---
Connecticut	2	---	---	28	1	56	---	---	22	---	---	1	103	---
MIDDLE ATLANTIC														
New York	7	2	[2] 19	804	10	327	4	---	[3] 169	---	---	8	191	19
New Jersey	3	---	8	1,018	1	72	2	---	55	---	---	1	169	1
Pennsylvania	10	---	---	398	7	94	1	---	154	---	---	5	226	4
EAST NORTH CENTRAL														
Ohio	---	---	7	223	6	48	---	---	295	---	---	1	264	13
Indiana	2	---	1	38	1	---	---	---	37	---	---	---	23	---
Illinois	1	---	5	182	9	106	3	---	81	---	2	1	83	2
Michigan	---	2	5	2,110	1	38	5	---	112	---	---	---	253	6
Wisconsin	2	---	209	529	4	23	---	---	87	---	1	1	74	---
WEST NORTH CENTRAL														
Minnesota	1	---	10	59	2	20	---	---	39	---	---	---	23	---
Iowa	3	---	159	1,083	---	2	4	---	14	---	---	---	4	6
Missouri	3	---	20	8	1	27	---	---	30	---	5	---	34	---
North Dakota	---	1	63	17	---	60	---	---	10	---	---	---	2	---
South Dakota	---	---	---	4	---	---	---	---	---	1	---	---	2	---
Nebraska	5	---	25	84	1	1	---	---	21	---	---	---	8	---
Kansas	---	---	71	12	---	20	---	---	35	---	2	---	27	2
SOUTH ATLANTIC														
Delaware	---	---	---	28	---	---	---	---	7	---	---	1	6	---
Maryland	3	---	10	56	2	47	---	---	43	---	---	1	73	---
District of Columbia	---	---	---	98	1	22	---	---	5	---	---	---	5	---
Virginia	6	---	6,534	47	8	155	---	---	21	---	---	3	40	1
West Virginia	9	---	2,047	207	1	45	1	---	40	---	---	---	47	14
North Carolina	9	---	---	162	1	---	---	---	23	---	---	---	45	---
South Carolina	3	1	389	56	1	13	---	1	2	---	---	---	17	5
Georgia	1	1	339	53	2	20	1	1	13	---	2	2	15	15
Florida	3	---	6	41	1	13	---	---	2	---	5	---	7	4

EAST SOUTH CENTRAL														
Kentucky	1	---	13	93	2	11	---	---	24	---	---	---	37	11
Tennessee	6	---	589	97	7	---	1	---	32	---	---	17	46	3
Alabama	2	---	521	44	3	63	---	---	10	---	2	1	11	12
Mississippi	5	---	101	102	---	47	3	---	4	---	3	3	3	9
WEST SOUTH CENTRAL														
Arkansas	4	---	788	20	1	81	1	---	3	---	6	3	28	---
Louisiana	2	---	5	12	2	25	2	---	8	---	---	2	3	---
Oklahoma	7	---	2,072	6	1	91	2	---	17	---	---	---	16	---
Texas	25	---	11,124	325	9	1,026	33	---	40	---	2	5	241	47
MOUNTAIN														
Montana	4	---	1,007	72	1	---	2	---	7	---	---	---	4	---
Idaho	---	---	154	209	---	9	---	---	27	---	---	---	4	---
Wyoming	---	---	2	10	---	4	---	---	1	---	---	---	2	---
Colorado	1	---	424	112	1	40	1	---	15	---	---	---	19	8
New Mexico	1	---	1	40	---	5	2	---	5	---	---	---	22	---
Arizona	---	---	151	108	---	41	---	---	11	---	---	1	80	---
Utah	---	---	94	174	1	4	1	---	7	---	---	---	18	---
Nevada	---	---	---	2	---	1	---	---	---	---	---	---	---	---
PACIFIC														
Washington	---	---	5	38	2	3	---	---	46	---	---	---	36	---
Oregon	1	---	42	19	---	11	4	---	25	---	---	---	36	---
California	8	---	13	362	8	66	12	---	147	---	---	5	160	3
Total	143	9	27,045	9,497	103	2,764	86	2	1,924	1	30	63	2,807	185
Median, 1945-49	248	9	5,532	20,408	90	---	38	1	3,079	8	18	44	2,254	---
Year to date 10 weeks	1,633	116	115,946	64,082	886	24,541	1,066	10	17,700	[4] 13	[4] 236	471	25,267	1,473
Median, 1945-49	2,972	69	62,582	122,429	870	---	443	6	28,020	40	213	437	22,390	---
	(27th)		(30th)	(35th)	(37th)		(11th)		(32d)	(35th)		(11th)	(39th)	
Seasonal low week ends	July 9	---	July 30	Sept. 3	Sept. 17	---	Mar. 19	---	Aug. 13	Sept. 3	---	Mar. 19	Oct. 1	
Since seasonal low week	5,904	---	146,476	83,212	1,799	---	42,548	---	34,139	[4] 20	---	3,814	46,803	---
Median, 1944-45 to 1948-49	10,538	---	95,557	148,553	1,806	---	19,382	---	53,431	94	---	3,965	45,477	---

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[1] Including cases reported as salmonellosis.

[2] New York City only.

[3] Including cases reported as streptococcal sore throat.

[4] Deductions: Smallpox—Wyoming, week ended Feb. 25, 2 cases; tularemia—Arkansas, week ended Jan. 28, 1 case.

Anthrax: Delaware and Massachusetts 1 case each.

Psittacosis: Ohio, 2 cases.

Alaska: Influenza 63, measles 10.

Hawaii: Influenza 7, pneumonia 1.

PLAGUE INFECTION IN LEA COUNTY, N. MEX.

Under date of March 9, 1950, plague infection was proved in Lea County from the following specimens: Fifty fleas, *Anomiopsyllus* sp. from 14 wood rats, *Neotoma albigula* trapped February 21, 1950, 1 mile east of Hobbs; 46 fleas, 45 *Anomiopsyllus* sp. and 1 *Orchopeas sexdentatus,* from a wood rat nest, *Neotoma,* 1 mile north of Hobbs; and 18 fleas, *Orchopeas sexdentatus,* from 5 wood rats, *Neotoma albigula,* trapped February 25, on U. S. Highway 62, 8 miles west of Hobbs.

DEATHS DURING WEEK ENDED MARCH 11, 1950

	Week ended Mar. 11, 1950	Corresponding week, 1949
Data for 94 large cities of the United States:		
Total deaths	10, 464	9, 829
Median for 3 prior years	9, 829	----------
Total deaths, first 10 weeks of year	97, 833	98, 877
Deaths under 1 year of age	626	682
Median for 3 prior years	682	----------
Deaths under 1 year of age, first 10 weeks of year	6, 304	6, 725
Data from industrial insurance companies:		
Policies in force	69, 832, 693	70, 550, 203
Number of death claims	13, 377	14, 913
Death claims per 1,000 policies in force, annual rate	10. 0	11. 0
Death claims per 1,000 policies, first 10 weeks of year, annual rate	9. 8	9. 8

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Weeks ended February 18 and 25, 1950.—During the weeks ended February 18 and 25, 1950, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Week Ended Feb. 18, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	3		67	1	433	274	43	36	55	101	1,013
Diphtheria			1		15	1					17
Dysentery, bacillary							3			3	6
Encephalitis, infectious						1				1	2
German measles			31		21	197		37	255	299	840
Influenza			156			7	4	4		2	173
Measles			23		720	504	25	23	112	102	1,509
Meningitis, meningococcal										1	1
Mumps			124	9	165	576	15	37	124	230	1,280
Poliomyelitis					1	1		1		1	4
Scarlet fever	2		4	6	91	40	14	3	51	11	222
Tuberculosis (all forms)	21		2	15	91	38	25	3	51	32	278
Typhoid and paratyphoid fever			1		13					39	53
Undulant fever					2	1					3
Venereal diseases:											
Gonorrhea	5	1	9	18	92	50	12	11	34	67	299
Syphilis	2	2	5	8	54	27	5	6	2	16	127
Other									1		1
Whooping cough			9		176	61	3	8	4	14	275

Week Ended Feb. 25, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox			30		314	318	47	37	48	65	859
Diphtheria					2	2	1				5
Dysentery, bacillary						1	2			2	5
Encephalitis, infectious							1				1
German measles			21		16	408		34	228	274	981
Influenza			70			4	1	2		8	85
Measles			14	46	747	620	19	50	78	112	1,686
Meningitis, meningococcal						2	1				3
Mumps			101	2	272	522	11	24	129	253	1,314
Poliomyelitis							3				3
Scarlet fever	2			1	118	42	14	5	68	7	257
Tuberculosis (all forms)	15		7	9	76	40	16	10	12	48	233
Typhoid and paratyphoid fever					8	1	1			1	11
Undulant fever			1		2	2					5
Venereal diseases:											
Gonorrhea	3		12	6	95	49	14	18	24	79	300
Syphilis	5		2	4	59	28	5	9	4	10	126
Whooping cough			25		82	33	6	4		17	167

JAPAN

Notifiable diseases—4 weeks ended January 28, 1950.—For the 4 weeks ended January 28, 1950, and for the year to date, certain notifiable diseases were reported in Japan as follows:

Disease	4 weeks ended January 28, 1950		Disease	4 weeks ended January 28, 1950	
	Cases	Deaths		Cases	Deaths
Diphtheria	1,183	131	Scarlet fever	371	2
Dysentery, unspecified	272	72	Schistosomiasis	6	---
Filariasis	5	---	Smallpox	3	---
Influenza	1,837	---	Tetanus	112	---
Leprosy	29	---	Trachoma	6,778	---
Malaria	37	7	Tuberculosis	25,444	---
Measles	3,263	---	Typhoid fever	278	48
Meningitis, epidemic	85	18	Typhus fever	18	2
Paratyphoid fever	77	5	Venereal diseases:		
Pneumonia	19,110	---	Gonorrhea	11,146	---
Poliomyelitis	134	---	Syphilis	8,243	---
Puerperal infection	74	---	Whooping cough	9,786	---
Rabies	6	---			

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

(Cases)

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January-December 1949	January 1950	February 1950—week ended—			
			4	11	18	25
ASIA						
Burma	[1] 253	---	---	---	---	---
Bassein	183	---	---	---	---	---
Moulmein	[1] 4	---	---	---	---	---
Ragoon	[1] 3	---	---	---	---	---
Ceylon	2	---	---	---	---	---
Trincomalee	2	---	---	---	---	---
China:						
Amoy	[2] 1	---	---	---	---	---
India	97,589	---	---	---	---	---
Ahmedabad	1	---	---	---	---	---
Allahabad	17	---	---	---	---	---
Bombay	[3] 6	---	---	---	---	---
Calcutta	[1] 5,512	312	187	177	110	---
Cawnpore	190	---	---	---	---	---
Cocanada	12	2	---	---	---	---
Cuddalore	2	---	---	3	6	6
Lucknow	[1] 34	---	---	---	---	---
Madras	434	3	---	1	3	1
Mangalore	---	---	---	14	---	---
Masulipatam	1	---	17	17	2	3
Nagpur	44	---	---	---	---	---
Negapatam	29	42	5	1	3	2
New Delhi	20	---	---	---	---	---
Tellicherry	---	10	7	10	---	---
Tuticorin	14	7	6	3	5	2
India (French):						
Karikal	55	---	---	---	---	---
Pondicherry	100	---	---	---	---	---
Indochina (French):						
Cambodia	45	---	---	---	---	---
Cochinchina	11	---	---	---	---	---
Pakistan	31,147	[4] 602	---	---	---	---
Chittagong	75	---	---	---	---	---
Dacca	[5] 101	7	2	---	---	---
Lahore	[1] 24	---	---	---	---	---
Siam (Thailand)	9	---	---	---	---	---
Bangkok	8	---	---	---	---	---

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[1] Includes imported cases. [2] Suspected. [3] Imported.
[4] Week ended Jan. 7. [5] Includes 2 deaths reported as cases.

PLAGUE

(Cases)

(P—present)

Place	January-December 1949	January 1950	February 1950—week ended—			
			4	11	18	25
AFRICA						
Basutoland	42					
Belgian Congo	[1] 18			1	2	
Costermansville Province	6			1	1	
Stanleyville Province	[1] 12				1	
British East Africa:						
Kenya	5					
Tanganyika	15					
Madagascar	129	15		[2] 6	[3] 1	
Tananarive	3					
Rhodesia, Northern	2					
Union of South Africa	[4] 112	3	1	P		
Cape Province	[1] [4] 57					
Orange Free State	[1] [4] 14	1				
Southwest Africa	[5] 3					
Transvaal	4					
ASIA						
Burma	[6] 501	19	7	12	3	
Mandalay	1					
Moulmein	[6] 6					
Pegu Town	1					
Rangoon	[6] 8					
Yenangyaung Town	1	1				
China:						
Chahar Province	[7] 69					
Chekiang Province	7					
Wenchow	7					
Fukien Province	20					
Kiangsi Province	9					
India	35,218	2	2		2	
Indochina (French)	128	9		5	1	5
Annam	69	4		5		5
Cambodia	24	5			1	
Cochinchina	[1] 32					
Laos	3					
Java	929	166	68	8	1	
Jogjakarta Residency	895	165	68	[8] 8		
Siam (Thailand)	183	12	2	3	15	
EUROPE						
Portugal: Azores	5					
SOUTH AMERICA						
Brazil:						
Bahia State	3					
Ceara State	9					
Pernambuco State	19					
Ecuador:						
Loja Province	19	1				
Peru:						
Lambayeque Department	10					
Libertad Department	3					
Lima Department	8					
Piura Department	10					
Tumbes Department	1					
Venezuela:						
Aragua State	2					
OCEANIA						
Hawaii Territory	1					

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[1] Includes cases of pneumonic plague. [2] Feb. 1-10, 1950. [3] Feb. 11-20, 1950. [4] Includes suspected cases. [5] Suspected. [6] Includes imported cases. [7] Outbreak July-November 1949. [8] In Jogjakarta City.

SMALLPOX

(Cases)

(P=present)

Place	January-December 1949	January 1950	February 1950—week ended—			
			4	11	18	25
AFRICA						
Algeria	301	13	--------	6	4	--------
Angola	748	--------	--------	--------	--------	--------
Basutoland	1	--------	--------	--------	--------	--------
Bechuanaland	6	--------	--------	--------	--------	--------
Belgian Congo	2, 224	114	23	84	--------	--------
British East Africa:						
Kenya	25	--------	--------	--------	--------	--------
Nyasaland	[1] 1, 296	46	4	--------	--------	--------
Tanganyika	970	27	--------	--------	--------	--------
Uganda	41	--------	--------	--------	--------	--------
Cameroon (British)	24	--------	--------	--------	--------	--------
Cameroon (French)	70	3	--------	7	--------	--------
Dahomey	437	36	--------	86	2	--------
Egypt	4	1	--------	--------	[2] 1	--------
Eritrea	1	--------	--------	--------	--------	--------
Ethiopia	12	--------	--------	--------	--------	--------
French Equatorial Africa	420	23	--------	--------	--------	--------
French Guinea	1	--------	--------	--------	--------	--------
French West Africa: Haute Volta	21	14	--------	10	18	--------
Gambia	66	--------	--------	--------	--------	--------
Gold Coast	56	--------	--------	--------	--------	--------
Ivory Coast	356	48	--------	34	--------	--------
Liberia	3	--------	--------	--------	--------	--------
Libya	--------	--------	--------	--------	2	--------
Morocco (French)	17	--------	--------	--------	--------	--------
Morocco (International Zone)	2	--------	--------	--------	--------	--------
Morocco (Spanish Zone)	3	--------	--------	--------	--------	--------
Mozambique	374	39	--------	--------	--------	--------
Nigeria	8, 564	690	--------	--------	--------	--------
Niger Territory	889	164	--------	43	--------	--------
Portuguese Guinea	1	--------	--------	--------	--------	--------
Rhodesia:						
Northern	22	1	--------	--------	--------	--------
Southern	862	113	--------	--------	--------	--------
Senegal	16	1	--------	1	--------	--------
Sierra Leone	143	--------	--------	--------	--------	--------
Sudan (Anglo-Egyptian)	[1] 258	[1] 5	3	--------	7	5
Sudan (French)	159	12	--------	5	--------	--------
Togo (French)	155	15	--------	8	--------	--------
Tunisia	1	--------	--------	--------	--------	--------
Union of South Africa	1, 444	21	P	P	P	--------
ASIA						
Afghanistan	259	--------	--------	--------	--------	--------
Arabia	[1] 284	107	15	8	10	9
Bahrein Islands	68	7	--------	4	--------	--------
Burma	[1] 2, 432	616	242	330	295	--------
Ceylon	[1] 2	--------	--------	--------	--------	--------
China	1, 031	51	2	68	30	2
India	72, 180	1, 581	595	563	555	388
India (French): Yanaon	1	--------	--------	--------	--------	--------
India (Portuguese)	224	--------	--------	--------	--------	--------
Indochina (French)	2, 749	50	--------	45	25	4
Iran	509	32	--------	--------	--------	--------
Iraq	750	36	5	--------	4	3
Israel	7	15	--------	--------	--------	--------
Japan	124	--------	--------	--------	--------	--------
Korea (Southern)	8, 951	10	--------	--------	--------	--------
Lebanon	[1] 145	[2] 1	--------	--------	--------	--------
Malay States (Federated)	46	--------	--------	--------	--------	--------
Manchuria: Port Arthur	9	--------	--------	--------	--------	--------
Netherlands Indies:						
Java	[1] 12, 901	136	32	27	12	19
Riouw Archipelago	2	--------	--------	--------	--------	--------
Sumatra	[1] 225	--------	--------	--------	[3] 27	--------
Pakistan	4, 553	232	--------	--------	--------	--------
Palestine	188	--------	--------	--------	--------	--------
Philippine Islands:						
Mindora Island	11	--------	--------	--------	--------	--------
Romblon Island	[2] 4	--------	--------	--------	--------	--------
Tablas Island	2	--------	--------	--------	--------	--------

See footnotes at end of table.

SMALLPOX—Continued

Place	January-December 1949	January 1950	February 1950—week ended—			
			4	11	18	25
ASIA—continued						
Portuguese Timor	4	-	-	-	-	-
Siam (Thailand)	110	325	-	-	-	-
Straits Settlements: Singapore	[1] 2	-	-	-	-	-
Syria	668	6	-	-	2	-
Transjordan	199	17	-	-	-	-
Turkey. (See Turkey in Europe.)						
EUROPE						
Belgium	1	-	-	-	-	-
Germany (U. S. Zone)	3	-	-	-	-	-
Great Britain: England and Wales	[1] 22	-	-	-	-	-
Italy	[4] 99	-	-	-	-	-
Portugal	9	-	-	-	-	-
Spain	3	-	-	-	-	-
Canary Islands	6	-	-	-	-	-
Turkey	92	1	-	1	-	3
NORTH AMERICA						
Cuba: Habana	[1] 6	-	-	-	-	-
Guatemala	4	-	-	-	-	-
Mexico	760	13	-	-	-	-
SOUTH AMERICA						
Argentina	500	87	26	-	-	-
Bolivia	35	-	-	-	-	-
Brazil	375	8	1	3	3	1
Chile	2	-	-	-	-	-
Colombia	2,846	19	-	-	-	-
Ecuador	647	28	-	-	-	-
Paraguay	12	-	-	-	-	-
Peru	3,769	-	-	-	-	-
Uruguay	10	-	-	-	-	-
Venezuela	2,339	1	-	-	-	-
OCEANIA						
Guam	2	-	-	-	-	-

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[1] Includes imported cases. [2] Imported.
[3] Suspected. [4] Includes 95 cases of varioloid reported in Rome Jan. 1–June 10, 1949.

TYPHUS FEVER*

(Cases)

(P—present)

AFRICA						
Algeria	95	16	-	8	-	-
Basutoland	27	3	-	-	-	-
Belgian Congo	[1] 49	[2] 4	-	-	-	-
British East Africa:						
Kenya	76	-	-	-	-	-
Nyasaland	4	-	-	-	-	-
Tanganyika	[3] 2	-	-	-	-	-
Egypt	182	3	-	-	-	-
Eritrea	81	3	3	-	-	-
Ethiopia	647	-	-	-	-	-
Gold Coast	[2] 6	1	-	-	-	-
Libya	196	10	-	7	4	-
Cyrenaica	21	4	-	4	2	-
Tripolitania	175	3	-	-	-	-
Madagascar: Tananarive	[3] 10	-	-	-	-	-
Morocco (French)	20	1	-	-	1	-
Morocco (International Zone)	-	1	-	-	-	-
Morocco (Spanish)	[2] 46	-	-	-	-	-
Nigeria	-	1	-	-	-	-
Sierra Leone	[1] 3	-	-	-	-	-
Sudan (Anglo-Egyptian)	-	-	-	-	4	-
Tunisia	[2] 73	2	-	-	-	-
Union of South Africa	210	P	P	P	P	-

See footnotes at end of table.

TYPHUS FEVER—Continued

Place	January-December 1949	January 1950	February 1950—week ended— 4	11	18	25
ASIA						
Afghanistan	1,616	-	-	-	-	-
Arabia: Aden	[4] 2	-	-	-	-	-
Burma	5	-	-	-	-	-
Ceylon: Colombo	[1] 6	-	-	-	-	-
China	64	[2] 3	-	-	-	-
India	239	4	-	-	-	-
India (Portuguese)	74	-	-	-	-	-
Indochina (French)	24	-	1	-	-	-
Iran	192	22	1	6	-	-
Iraq	106	7	1	1	3	1
Japan	115	70	14	102	238	96
Korea (Southern)	[2] 1,196	8	-	-	-	-
Lebanon	[2] 4	-	-	-	-	-
Pakistan	629	4	-	9	5	3
Palestine	114	-	-	-	-	-
Philippine Islands: Manila	[1] 1	-	-	-	-	-
Straits Settlements: Singapore	[2] 5	[2] 2	-	-	-	-
Syria	[2] 30	1	-	-	-	-
Transjordan	69	2	-	-	-	-
Turkey. (See Turkey in Europe.)						
EUROPE						
Belgium	[2,4] 5	-	-	-	-	-
Bulgaria	393	-	-	-	-	-
Czechoslovakia	22	-	-	-	-	-
France	5	-	1	-	-	-
Germany (U. S. Zone)	2	-	-	-	1	-
Great Britain:						
England and Wales	[1] 4	-	-	-	-	-
Malta and Gozo	[1] 31	-	-	-	-	-
Greece	79	-	-	-	-	-
Hungary	20	-	-	-	-	-
Italy	[2] 27	-	-	-	-	-
Sicily	[5] 21	-	-	-	-	-
Poland	373	22	-	-	-	-
Portugal	6	-	-	-	-	-
Rumania	417	-	-	-	-	-
Spain	13	1	-	-	-	-
Turkey	239	20	2	10	5	6
Yugoslavia	234	7	-	-	-	-
NORTH AMERICA						
Bahama Islands: Nassau	[1] 1	-	-	-	-	-
Costa Rica [1]	52	-	1	-	-	-
Cuba [1]	4	-	-	-	-	-
Guatemala	58	-	-	-	-	-
Jamaica [1]	19	2	-	1	-	-
Mexico [2]	253	5	2	7	-	-
Panama Canal Zone [1]	13	-	-	-	-	-
Panama (Republic)	[1] 5	-	-	-	-	-
Puerto Rico [1]	44	1	-	1	-	-
SOUTH AMERICA						
Argentina	[1] 2	-	-	-	-	-
Bolivia	53	-	-	-	-	-
Brazil	6	-	-	-	-	-
Chile	376	15	6	-	2	-
Colombia	[2] 2,795	26	-	-	-	-
Curacao	[1] 5	-	-	-	-	-
Ecuador	[2] 356	[2] 23	-	-	-	-
Peru	1,399	-	-	-	-	-
Venezuela [2]	129	-	-	1	-	-
OCEANIA						
Australia [1]	133	15	1	-	-	-
Hawaii Territory [1]	17	-	-	-	-	-

*Reports from some areas are probably murine type, while others include both murine and louse-borne types.

[1] Murine type.
[2] Includes murine type.
[3] In Dar es Salaam.
[4] Includes imported cases.
[5] Corrected figure.

YELLOW FEVER

(C=cases; D=deaths)

Place		January-December 1949	January 1950	February 1950—week ended—			
				4	11	18	25
AFRICA							
Belgian Congo:							
Stanleyville Province	D	5					
French Equitorial Africa:							
Bangui	D	1					
Gold Coast	C	22	1				
Accra	D	1					
Ankobra Ferry	D						
Komenda Village [3]	D	1					
Nkwanta Dunkwa Area	D	1					
Oda Area:							
Akwatia	C	4					
Atiankama	C	1					
Bawdua	C	3					
Esuboni	C	3					
Oseikrome Village	D	1					
Winneba Area:							
Apam	D	1					
Akukuom	D	1					
Nyakrom	C	5					
Nigeria:							
Kaduna	D	1					
Lagos	D	[1] 2					
Sierra Leone:							
Freetown	D	[1] 1					
Koinadugu District	C	1					
Sudan (French):							
Bamako	D	[2] 1					
NORTH AMERICA							
Panama:							
Colon Province	D	3	1				
Pacora	C	8					
SOUTH AMERICA							
Bolivia:							
Chiquisaca Department	C		70				
Brazil:							
Acre Territory	D	1					
Amazonas State	D	1					
Para State	D	3					
Ecuador:							
Napo Pastaza Province	D	1					
Peru:							
Cuzco Department	D	3					
San Martin Department	D	1					

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[1] Imported.

[3] Suspected.

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
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Division of Public Health Methods
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Public Health Reports

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—Editorial—

Protection for the Laboratory Worker

Over the past few years it has become increasingly evident that bacteriologists who work in diagnostic and research laboratories are exposed to hazards of infection far beyond those met in ordinary living. Such studies as the one by Sulkin and Pike (*1*) on viral infections contracted in laboratories give us an estimate of the unseen and frequently unrecognized dangers present in the laboratory. Of the 222 cases of laboratory infection reported in that study, only 27 were due to known accidents. The fact that danger in the laboratory is not confined to the observable accident is borne out by research which has been done at Camp Detrick, Md. (*2*). By using sieve type air samplers, placed at appropriate distances around the laboratory working area, the investigators at Camp Detrick were able to determine that bacterial aerosols were released during such common laboratory operations as the removal of stoppers from dilution bottles, removal of wet plugs from broth culture tubes, and removal of an inoculum from a vaccine bottle with a hypodermic syringe. The production of bacterial aerosols by pipetting, pouring, and vigorous agitation of dilution blanks was further shown by means of high-speed photography in a study by Johansson and Ferris (*3*), also at Camp Detrick.

The conclusion that we can draw from these studies, in relation to the tuberculosis laboratory, presents us with a grave problem in safeguarding the worker. It would be inconsistent with our concern for the health of all people to take an attitude of resignation about the contraction of tuberculosis by workers in laboratories. We must not take it for granted that scientists will inevitably be infected by the materials with which they work. If the probability exists, greater efforts should be made to remove it.

Since the risks following exposure to tubercle bacilli depend a great

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This is the fiftieth of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which appear in the first week of each month. The series began with the Mar. 1, 1946, issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

deal upon the inoculum size, it seems important to stress the fact that the use of techniques which avoid heavy exposure will undoubtedly reduce the incidence of laboratory infection.

Laboratory technicians and investigators in sanatoria in the past were usually former patients who had a certain amount of protection from their arrested disease. Since laboratories in health departments and research centers are increasingly drawing their personnel from the general public, the risk is now greater. While our information on the incidence of laboratory infections is too meager to have great validity, individual instances of tuberculosis contracted in laboratories which employ nontuberculous personnel are known in sufficient number to cause concern. Much evidence indicates that tuberculin negative individuals should not handle virulent organisms. It has been shown repeatedly that adults with naturally acquired tuberculin sensitivity develop fewer cases of clinical tuberculosis than those who have not previously overcome an infection. It would therefore be desirable to select tuberculosis laboratory workers, when possible, from tuberculin-positive individuals, assuming this sensitivity state to be associated with at least some degree of immunity. This procedure may not always be feasible, however, inasmuch as the proportion of tuberculin-positive reactors in the technicians' age group today is relatively low. For tuberculin-negative workers especially, an active immunizing agent is needed. Since BCG vaccine is the most promising agent today, as it becomes available advantage may be taken of whatever protection it affords.

Dr. Arnold G. Wedum, the Safety Director of the Biological Department, Army Chemical Corps, at Camp Detrick, considers that the most important single item in a laboratory safety program is the provision of adequate bacteriological transfer cabinets, properly equipped with ventilating devices so that aerosols will be swept away. The design of such hoods is a matter of great importance, since improperly designed hoods hinder laboratory operations. Extensive work on developing this kind of equipment has been carried out in a number of laboratories, at Camp Detrick, at the National Institutes of Health, at Notre Dame University, and during the war in Naval Research Unit No. 1 at Berkeley, Calif.

This issue of PUBLIC HEALTH REPORTS includes a paper which describes the safety procedures practiced at the tuberculosis laboratory of the Communicable Disease Center. No one laboratory has all the answers to questions of protection; exchange of ideas on the subject should be profitable to all.

There is little excuse for saying that we do not know how to provide proper equipment. We do not have conclusive information about protection, but it is certain that careful and complete use of what we do know will reduce the risks.

The question of cost is sure to arise. Proper laboratory equipment is expensive. Proper care slows down procedures. Undoubtedly the laboratory where all possible measures are taken to minimize hazards will spend considerably more for the same operations than the laboratory which sacrifices safety to economy. But those who are concerned with the control of tuberculosis know too well the ultimate costs of every case to need to argue such a point. Even if we were to proceed on the basis of economy alone, without regard for other values, the use of every possible safety measure would still be warranted. The values, however, which concern the well-being of individuals and of the community are those which decide our final aims. We must not overlook this important step in protecting those values.

ROBT. J. ANDERSON, *Medical Director,*
Chief, Division of Tuberculosis.

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(*3*) Johansson, K. R. and Ferris, D. H.: Photography of airborne particles during bacteriological plating. J. Infect. Dis. **78**: 238–252 (1946).

Safety Measures in a Tuberculosis Laboratory

By Charles H. Fish, M. D., and George A. Spendlove, M. D.*

With the increasing use of cultural methods and animal inoculations in the laboratory diagnosis of tuberculosis, the hazards of accidental infection among laboratory workers are becoming a matter of constantly greater concern to laboratory directors. In the Tuberculosis Laboratory Unit, Communicable Disease Center, Public Health Service, certain safety procedures have been formulated which are presented here with the full realization that they are empirical and not in any way conclusive. There is great need for scientific study of the whole problem of safety in the laboratory. It is hoped, however, that this may serve as a check list for use by other laboratories in evaluating safety measures now in use and in considering possible improvements.

1. Thorough instruction is given in (1) aseptic technique; (2) methods of handling specimens, cultures, and animals; (3) methods of avoiding contamination of self, others, and surroundings; and (4) methods of decontamination of self and surroundings.

2. An exhaust hood equipped with ultra-violet light, exhaust fan, and sterilizer, is provided for transfer of cultures. Ultraviolet light in the hood is turned on for 10 minutes before and after transfer of cultures.

3. Medical and health program:

   (*a*) Physical examination, including chest X-ray, is required before employment.

   (*b*) Tuberculin tests are done on all personnel.[1]

   (*c*) Chest X-rays are required every 3 months.

   (*d*) It is emphasized that fatigue, emotional stress, and malnutrition act as contributory factors to the development of tuberculosis after exposure.

   (*e*) Illnesses are reported immediately.

   (*f*) Accidents are reported immediately.

   (*g*) Fifteen-minute rest periods are allotted in morning and afternoon.

4. Use of equipment:

   (*a*) The use of mouth pipettes in contaminated rooms is prohibited.

   (*b*) Sterile masks are worn during transfer of cultures. Masks are disposed of as contaminated material after use.

---

*Surgeon, acting in charge of the Tuberculosis Laboratory Unit, Communicable Disease Center, and Tuberculosis Control Officer, Utah State Department of Health (formerly with CDC), respectively.

[1] This laboratory is one in which the applicability of BCG is being studied. Nonreactors to tuberculin are vaccinated with BCG when they begin work in the laboratory.

(*c*) Rubber gloves, masks, and goggles are worn while doing animal inoculations and autopsies.

(*d*) Grinding of dry pathogenic mycobacteria in an open container is prohibited.

(*e*) Needles and syringes are checked for defects before use. Only "Luer-Lok" syringes are used for animal inoculations.

5. Handling of animals:

(*a*) Animals are autopsied on metal trays to prevent contamination of tables.

(*b*) Animal inoculations and autopsies are done behind a plexi-glass screen for protection against accidental contamination of clothing.

(*c*) Discarded autopsied animals are wrapped in wax paper and incinerated.

6. Rooms where specimens are received, cultures transferred, infected animals are housed, and where animals are inoculated and autopsied, are considered contaminated, as are the outsides of containers of specimens, needles, syringes, metal trays, and all objects used in the transfer of cultures.

7. Decontamination procedures:

(*a*) Needles, syringes, and metal trays are autoclaved before washing. Instruments are boiled before washing. Large equipment and stationary objects, if contaminated, are kept in contact with 5 percent saponated cresol for 30 minutes. Infected material is discarded in a splash-proof can.

(*b*) Floors are swept with a dust reducing compound and mopped daily with hot soapy water containing 5 percent cresol.

(*c*) Table tops are swabbed daily, after work, with 5 percent saponated cresol or with 70 percent alcohol.

8. Personal procedures:

(*a*) Short sleeved laboratory coats are worn in contaminated rooms.

(*b*) Laboratory coats are removed before leaving contaminated rooms.

(*c*) Contaminated hands are washed for 2 minutes with soap and water, rinsed with 70 percent alcohol, and allowed to dry in air. (70 percent alcohol dispensers are situated in convenient locations.)

9. Miscellaneous:

(*a*) Safety signs (NO SMOKING, CONTAMINATED AREA, REPORT ACCIDENTS IMMEDIATELY) are situated in easily discernible locations.

(*b*) No smoking is allowed in contaminated rooms.

(*c*) Laboratory rooms are draft free, air-conditioned, and adequately lighted.

(*d*) Adequate rest-room facilities are provided.

(*e*) Shower facilities are provided for those personnel handling infected animals and cleaning infected animal cages.

(*f*) First-aid kits and fire extinguishers are easily available and are inspected periodically.

(*g*) Care is taken to avoid skin contact with cresols and streptomycin in order to avert sensitivities.

Tuberculosis Mortality in the United States, 1948

By LILLIAN GURALNICK and STANLEY GLASER*

An increasing rate of decline in tuberculosis mortality in the United States has been recorded in each of the years since the close of the war. In 1948, there were 43,833 deaths from tuberculosis (all forms) representing a mortality rate of 30.0 per 100,000 estimated midyear population, which was 10 percent below the rate of 33.5 recorded in 1947. The 1947 rate was 7 percent below that for 1946 which, in turn, was 5 percent lower than the rate for 1945.[1] On the basis of a 10-percent sample of death certificates, the 1949 rate is expected to be 10-percent less than that for 1948.

This paper, the seventh in a series of annual reports (*1–6*), presents data on the number of deaths and on death rates for tuberculosis in the United States and in each State for 1948, together with comparable data for 1947 and the prewar period, 1939–41. The trend of the death rate for respiratory tuberculosis by age is discussed for the 21-year period, 1928–48.

A true measure of the changes in the nature of the tuberculosis problem cannot be obtained from mortality data alone. Knowledge of the incidence, prevalence, and case fatality rates is especially important in understanding the epidemiology of this chronic disease. In the absence of more complete data, the varying reductions in the mortality from tuberculosis in different areas and population groups can serve as a guide to further investigation.

Trend in the Death Rate

The rates in table 1 show a steady decline in tuberculosis mortality since 1910, the first year for which these data are available by both race and sex. The downward trend of the death rate was interrupted three times during this period in 1918, 1926, and 1936. The trends of the rates for the white and nonwhite population are roughly parallel during this period, and since 1930, the rates for the white and nonwhite females have been lower, and have declined faster, than the rates for males in the corresponding race group.

The slower rate of decline in tuberculosis mortality for the entire population, and the apparent increase in the rates for males from 1940–1945 are a reflection of population changes rather than an indication of any increase in the risk of mortality from tuberculosis. Beginning

---

*Biostatistician, National Office of Vital Statistics, and, Statistician, Division of Tuberculosis, Public Health Service, respectively.

[1] The rates for 1945 and 1946 are based on population including armed forces overseas.

Table 1. *Death rates for tuberculosis (all forms) by race and sex: death registration States, 1910–48*

[Rates per 100,000 estimated midyear population in each specified group]

Year	All races			White			Nonwhite		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
1948[1]	30.0	39.4	20.8	24.3	33.3	15.4	78.4	92.1	65.4
1947[1]	33.5	43.0	24.2	27.1	36.3	18.0	88.1	100.6	76.1
1946[1]	36.4	46.2	26.9	29.8	39.2	20.6	92.3	106.2	79.2
1945[1]	40.1	53.0	28.6	32.7	45.1	21.7	102.6	120.9	86.5
1944[1]	41.3	53.1	30.5	33.7	45.0	23.3	106.2	122.7	91.3
1943[1]	42.6	52.9	32.6	34.3	44.4	24.7	112.9	126.4	100.0
1942[1]	43.1	52.3	34.0	34.4	43.3	25.6	118.4	131.4	106.0
1941[1]	44.5	52.5	36.5	35.4	43.3	27.4	124.2	134.3	114.5
1940[1]	45.8	54.1	37.5	36.5	44.7	28.2	127.6	138.7	116.9
1939	47.1	54.0	40.1	37.7	44.7	30.6	129.1	137.3	121.1
1938	49.1	56.0	42.1	39.1	46.2	31.9	136.8	144.0	129.8
1937	53.8	61.3	46.2	43.4	50.9	35.8	145.0	155.0	135.2
1936	55.9	63.4	48.2	45.0	52.2	37.6	151.6	163.9	139.6
1935	55.1	62.1	47.9	44.9	51.7	37.8	145.1	155.4	135.0
1934	56.7	63.1	50.1	46.2	52.7	39.6	148.8	156.9	140.8
1933	59.6	65.4	53.7	48.5	54.3	42.6	157.7	165.6	149.9
1932	62.5	68.0	56.8	50.2	55.9	44.4	173.5	179.5	167.5
1931	67.8	73.5	62.0	54.2	60.1	48.2	191.1	197.4	184.9
1930	71.1	76.2	65.9	57.7	63.4	51.9	192.0	194.3	189.8
1929	75.3	79.3	71.3	62.4	67.1	57.6	192.0	191.5	192.6
1928	78.3	82.5	74.1	64.9	69.7	59.9	199.5	199.4	199.6
1927	79.6	82.9	76.1	66.5	70.7	62.2	208.7	205.4	212.1
1926	85.5	89.1	81.7	72.0	76.4	67.5	223.8	221.5	226.1
1925	84.8	88.0	81.4	71.6	75.8	67.2	221.3	215.8	226.7
1924	87.9	91.5	84.3	74.9	79.3	70.4	218.6	215.0	222.3
1923	91.7	95.4	87.9	79.5	84.4	74.5	213.1	206.3	220.0
1922	95.3	99.5	91.0	82.6	87.5	77.4	218.9	216.6	221.2
1921	97.6	101.1	94.1	84.7	89.1	80.2	239.3	233.7	245.1
1920	113.1	116.6	109.5	99.5	104.1	94.8	262.4	255.4	269.6
1919	125.6	134.2	116.9	110.9	121.1	100.4	284.0	275.5	292.7
1918	149.8	167.7	131.8	134.3	153.2	115.4	346.0	351.0	340.9
1917	143.5	158.7	127.7	129.6	------	------	332.6	------	------
1916	138.4	152.9	123.3	125.7	141.3	109.5	322.7	322.3	323.0
1915	140.1	155.9	123.5	128.5	144.0	112.2	401.1	420.2	380.5
1914	141.7	158.5	123.9	130.3	146.9	112.9	396.7	417.8	374.0
1913	143.5	158.7	127.4	132.6	147.7	116.7	386.5	401.9	369.9
1912	145.4	159.3	130.7	136.0	149.4	121.8	429.0	459.9	394.5
1911	155.1	168.2	141.3	145.0	157.5	131.9	461.4	484.8	435.2
1910	153.8	167.1	139.8	145.9	158.2	132.8	445.5	479.3	406.8

[1] Excludes deaths among armed forces overseas. Rates based on population excluding armed forces overseas

Note.—The death registration States increased in number from 20 States and the District of Columbia in 1910 to the entire continental United States in 1933.

with 1940, the tuberculosis death rates shown in table 1 are computed for the population present in the country, and do not include members of the armed forces overseas or deaths occurring in the overseas population. Rates computed on such a basis are not entirely satisfactory for a chronic disease. In the case of tuberculosis, most deaths occurred in this country since the armed forces were screened for tuberculosis on entry into service, and those who became ill overseas were presumably returned to this country for hospitalization. Consequently, the tuberculosis death rates computed only for the population present in the country overstate mortality risks for the war years in comparison with those for the prewar or postwar years, particularly for men of military age.

For tuberculosis, a more comparable measure of risk for the war years is provided by rates computed for the entire population, whether in this country or overseas, including the deaths among the armed forces overseas. However, the number of deaths overseas has been comparatively small, not exceeding 155 or 0.3 percent of the total tuberculosis deaths in any year, so that little difference is made in the rate by their inclusion or omission. Since the data are not readily available by age at death, it has been found more convenient to omit the overseas deaths in this report. An approximation of these rates for the total population, obtained by relating the tuberculosis deaths occurring in this country to the population, including the armed forces overseas, is presented below. These figures have been used to plot the points for 1940–48 in figure 1.

Year	Rates based on population including armed forces overseas			
	Total	Total male	White male	Nonwhite male
1948	29.9	39.1	33.1	91.6
1947	33.4	42.6	36.0	99.9
1946	36.0	45.3	38.5	104.6
1945	37.9	47.3	40.1	110.3
1944	39.6	48.8	41.3	115.4
1943	41.8	50.9	42.6	124.6
1942	42.8	51.6	42.7	130.8
1941	44.5	52.4	43.2	134.3
1940	45.8	54.1	44.7	138.7

Figure 1 shows the trend of the total rate for tuberculosis for the United States from 1910 to 1948, and of the rates for the four race-sex groups. The decline in mortality rates for white males was retarded during the war years, but there was no actual rise in the rates. For the postwar years, the increased rate of fall which is conspicuous in the trend line for the total population can be observed as well in the rates for white males, beginning with 1944, and for white females beginning with 1947. For the nonwhite population, 1948 is the first postwar year showing an increased rate of decline.

The varying rates of decline for the four race-sex groups have altered the race and sex differentials in tuberculosis mortality since 1910. Considering the rate for white males for each year as a base, the ratio of the rates for the other race-sex groups to that for white males is shown below for several selected years.

Year	White		Nonwhite	
	Male	Female	Male	Female
1910	100	84	303	257
1933	100	78	305	276
1940	100	63	310	262
1948	100	47	277	198

The greater rate with which mortality for white females has declined is emphasized by these ratios. It is also interesting to note, that, while the rates for both whites and nonwhites descended rapidly, only

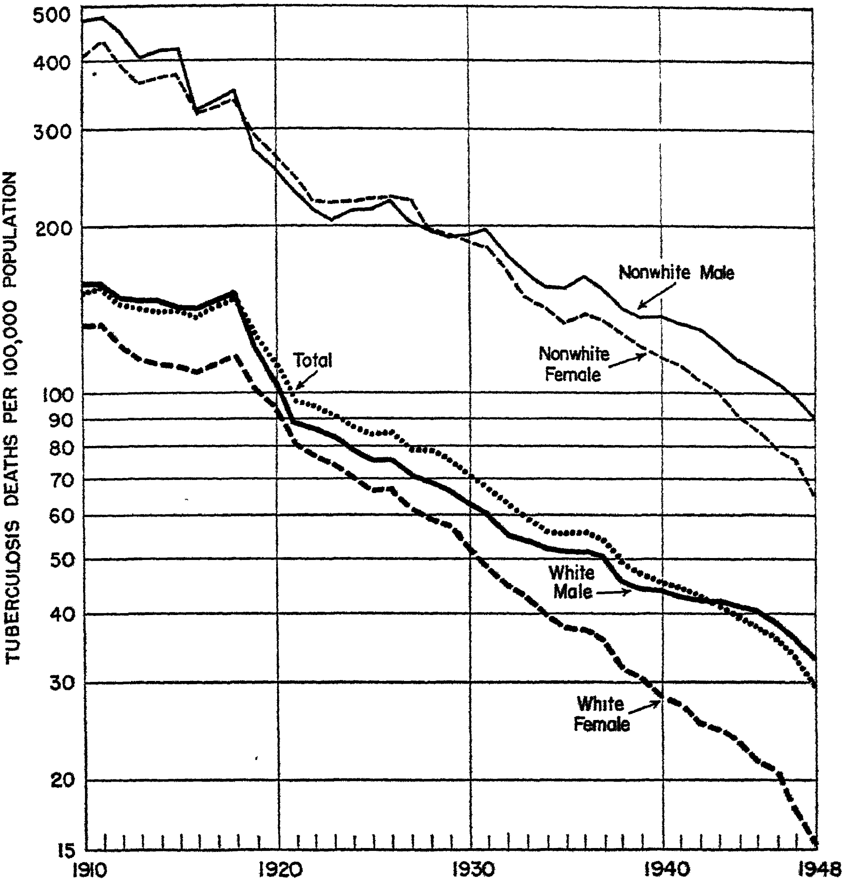

Figure 1. Death rates for tuberculosis (all forms), by race and sex: death registration States, 1910–1948. (The rates for 1940–48 are computed from deaths excluding those among the armed forces overseas, and population including the armed forces overseas.)

in the past decade is there any indication that the gap in the rates between the race groups is growing narrower.

Respiratory Tuberculosis: Mortality by Age, Race, and Sex

The change in the pattern of the age-specific death rates for respiratory tuberculosis has been the most prominent feature of mortality from this disease in the past 21 years. As a result of the more rapid decline in the rates at the younger ages, tuberculosis has changed from a disease whose greatest toll was among young adults, to one for which the death rate increases with increasing age.

In 1948, the curve of the age-specific death rates for nonwhite females (fig. 2) is the only one in the four race-sex series showing a

Table 2. *Number of deaths and death rates for tuberculosis (all forms), by age, race and sex: United States, 1939–41 average, 1947 and 1948*

[Exclusive of deaths among armed forces overseas. Rates per 100,000 estimated midyear population in each specified group, excluding armed forces overseas]

Race, sex, and year	All ages[1]	Under 5 years	5–9 years	10–14 years	15–19 years	20–24 years	25–29 years	30–34 years	35–44 years	45–54 years	55–64 years	65–74 years	75–84 years	85 years and over	Not stated
	NUMBER														
All races, both sexes:															
1948	43,833	1,138	216	282	1,190	2,743	3,226	3,365	7,573	8,165	7,737	5,545	2,286	337	30
1947	48,064	1,099	226	373	1,720	3,612	3,896	3,801	8,314	8,865	7,999	5,586	2,236	308	29
1939–41	60,429	1,613	475	799	3,388	5,719	6,236	5,811	10,846	10,373	7,960	5,104	1,815	236	53
Male:															
1948	28,552	594	106	103	427	1,099	1,425	1,779	4,831	6,360	6,169	3,974	1,474	192	19
1947	30,585	579	107	148	637	1,440	1,685	1,919	5,338	6,845	6,377	3,971	1,359	163	17
1939–41	35,433	831	251	306	1,234	2,306	2,782	3,038	6,803	7,650	5,786	3,308	989	119	30
Female:															
1948	15,281	544	110	179	763	1,644	1,801	1,586	2,742	1,805	1,568	1,571	812	145	11
1947	17,479	520	119	225	1,083	2,172	2,211	1,882	2,976	2,020	1,622	1,615	877	145	12
1939–41	24,996	782	224	493	2,154	3,413	3,454	2,773	4,043	2,723	2,174	1,796	826	117	23
White, both sexes:															
1948	31,750	728	134	131	496	1,315	1,759	2,077	5,126	6,194	6,469	4,893	2,106	304	18
1947	34,783	724	122	150	764	1,795	2,209	2,406	5,778	6,726	6,823	4,917	2,044	277	18
1939–41	43,282	1,014	265	372	1,617	3,180	3,828	3,827	7,605	8,183	6,865	4,596	1,693	211	28
Male:															
1948	21,616	375	66	51	191	529	797	1,123	3,326	4,926	5,206	3,501	1,343	171	11
1947	23,167	377	57	63	296	717	988	1,206	3,752	5,314	5,491	3,531	1,222	143	10
1939–41	26,350	520	141	152	589	1,239	1,690	2,000	4,848	6,143	5,042	2,955	908	105	19
Female:															
1948	10,134	353	68	80	305	786	962	954	1,800	1,268	1,263	1,392	763	133	7
1947	11,616	347	65	87	468	1,078	1,221	1,200	2,026	1,412	1,332	1,416	822	134	8
1939–41	16,932	494	124	220	1,028	1,941	2,138	1,827	2,757	2,040	1,823	1,641	785	106	9
Nonwhite, both sexes:															
1948	12,083	410	82	151	694	1,428	1,467	1,288	2,447	1,971	1,268	652	180	33	12
1947	13,281	375	104	223	956	1,817	1,687	1,395	2,536	2,139	1,176	639	192	31	11
1939–41	17,147	599	210	427	1,771	2,539	2,408	1,984	3,241	2,190	1,095	508	123	26	25
Male:															
1948	6,936	219	40	52	236	570	628	656	1,505	1,434	963	473	131	21	8
1947	7,418	202	50	85	341	723	697	713	1,586	1,531	886	440	137	20	7
1939–41	9,083	311	110	154	645	1,067	1,092	1,038	1,955	1,507	744	353	81	15	11
Female:															
1948	5,147	191	42	99	458	858	839	632	942	537	305	179	49	12	4
1947	5,863	173	54	138	615	1,094	990	682	950	608	290	199	55	11	4
1939–41	8,064	288	100	273	1,126	1,472	1,316	946	1,286	683	351	155	42	11	14

RATE

All races, both sexes:															
1948	30.0	7.5	1.7	2.6	10.9	23.1	27.1	30.1	37.1	48.0	59.2	74.0	76.1	75.6	---
1947	33.5	7.5	1.9	3.5	15.6	30.3	33.3	34.2	41.4	52.8	62.8	76.2	77.6	70.2	---
1939-41	45.8	15.2	4.4	6.8	27.5	49.2	50.2	56.5	58.9	66.8	74.7	80.4	79.7	63.2	---
Male:															
1948	39.4	7.7	1.6	1.9	7.8	18.8	24.6	32.9	48.2	75.3	94.2	109.5	106.5	100.5	---
1947	43.0	7.8	1.7	2.7	11.7	24.7	29.7	35.6	54.0	81.8	99.4	111.5	101.8	86.7	---
1939-41	53.5	15.4	4.6	5.2	20.0	40.5	51.1	59.7	73.8	96.1	106.1	105.0	91.4	74.3	---
Female:															
1948	20.8	7.4	1.7	3.3	14.1	27.3	29.4	27.4	26.4	21.1	24.0	40.7	50.1	56.9	---
1947	24.2	7.3	2.0	4.3	19.5	35.7	36.6	32.8	29.2	24.0	25.6	42.8	56.7	57.8	---
1939-41	38.0	14.9	4.2	8.6	35.1	57.7	61.1	53.4	43.9	36.0	41.8	56.2	69.1	54.8	---
White, both sexes:															
1948	24.3	5.5	1.2	1.4	5.2	12.5	16.5	20.7	27.9	40.1	53.4	69.9	75.1	77.7	---
1947	27.1	5.6	1.2	1.6	7.9	17.0	21.1	24.2	32.0	44.0	57.7	72.2	76.0	71.2	---
1939-41	36.5	10.9	2.8	3.6	14.8	30.7	38.7	41.4	46.0	57.6	69.4	77.7	79.0	62.8	---
Male:															
1948	33.3	5.5	1.2	1.1	4.0	10.2	15.4	23.1	36.7	64.1	85.8	103.7	104.4	101.2	---
1947	36.3	5.7	1.1	1.3	6.2	13.8	19.4	24.9	42.0	69.7	92.4	106.6	98.3	85.1	---
1939-41	44.2	11.0	3.0	2.9	10.7	24.2	34.6	43.6	58.4	84.3	99.9	101.0	89.3	72.7	---
Female:															
1948	15.4	5.5	1.2	1.7	6.4	14.8	17.7	18.5	19.3	16.3	20.9	38.4	50.3	59.9	---
1947	18.0	5.5	1.3	1.9	9.6	20.0	22.7	23.5	22.1	18.5	22.6	40.0	56.8	60.6	---
1939-41	28.7	10.8	2.7	4.3	18.9	37.0	42.7	39.3	33.5	29.5	37.7	54.9	69.8	55.4	---
Nonwhite, both sexes:															
1948	78.4	22.3	4.8	10.5	51.9	105.7	114.7	109.7	120.9	125.7	133.8	133.6	89.1	60.0	---
1947	88.1	21.3	6.4	16.0	71.4	135.0	134.4	110.0	126.6	140.2	127.5	133.4	99.5	62.0	---
1939-41	126.9	45.1	15.3	30.8	129.2	202.2	201.5	190.8	171.9	167.7	142.5	118.6	90.9	69.2	---
Male:															
1948	92.1	23.8	4.7	7.2	35.8	86.5	103.5	121.7	157.1	188.4	199.8	187.7	135.1	95.5	---
1947	100.6	22.9	6.1	12.2	52.0	110.4	118.3	131.8	166.9	205.2	187.3	178.1	148.9	100.0	---
1939-41	136.7	47.2	16.1	22.3	96.7	182.3	195.4	208.1	213.4	224.7	182.2	158.4	121.4	95.3	---
Female:															
1948	65.4	20.8	5.0	13.8	67.7	124.2	124.7	99.5	88.3	66.5	65.5	75.8	46.7	36.4	---
1947	76.1	19.6	6.6	19.7	90.0	158.3	148.9	108.1	90.2	78.0	64.7	86.1	54.5	36.7	---
1939-41	117.5	43.1	14.5	39.2	160.0	219.6	206.9	174.9	132.7	107.5	97.6	75.5	59.8	50.4	---

[1] Includes deaths for which age was not stated.

Note: Average numbers of deaths for 1939-41 are rounded without being adjusted to group totals.

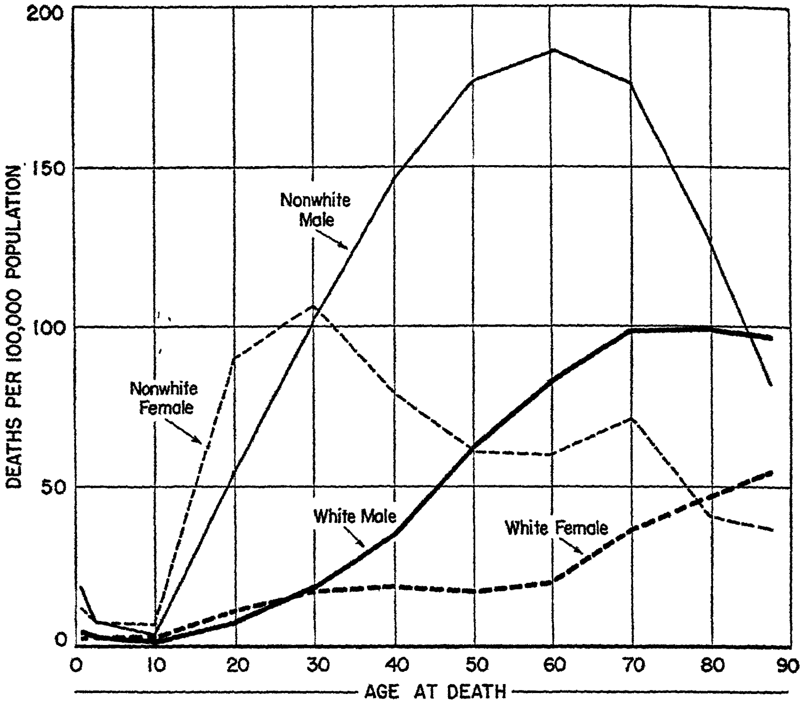

Figure 2. Death rates for respiratory tuberculosis by age, race, and sex: United States, 1948.

peak in the young adult ages. However, when the number of deaths is examined as a proportion of deaths from all causes at each age (proportionate mortality), rather than as a ratio to the population at that age (age-specific death rate), it is clear that tuberculosis is a more important cause of death in the young adult ages than in the age group over 55. The age group 15–24 in the nonwhite females, and 25–34 in the other 3 race sex-groups now represent the peaks of the proportionate mortality distribution, as shown in figure 3 for each race and sex. Respiratory tuberculosis accounts for one-third of all deaths among nonwhite females between the ages 15–24. At ages 25–34, one-quarter of the deaths of nonwhite females are due to respiratory tuberculosis; 19 percent of deaths of nonwhite males; 13 percent of the white females; and 9 percent of the white males.

The number of deaths from respiratory tuberculosis has decreased faster than deaths from all causes for the white population at practically every age in the past 21 years. In the nonwhite population, however, the ratio of deaths from tuberculosis to the total number of deaths from all causes has not dropped as much as in the white population. In fact, respiratory tuberculosis deaths of nonwhite

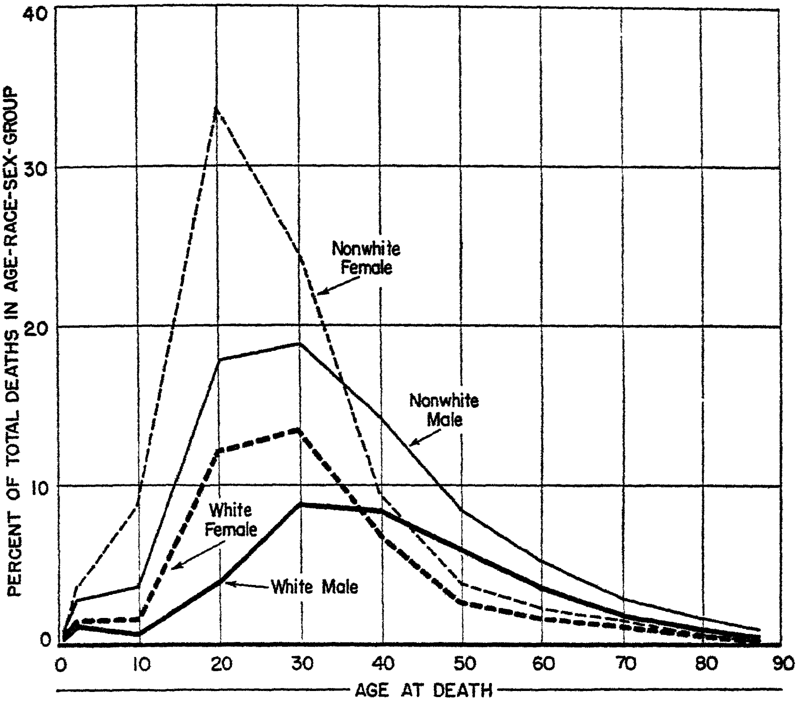

Figure 3. Deaths from respiratory tuberculosis as percentage of deaths from all causes, by age, race, and sex: United States, 1948.

females in the peak age groups form almost the same proportions of the total deaths at those ages in 1948 as were recorded in 1928. All other age groups show a small decrease. The relative decrease in the number of deaths from this cause compared to total deaths in the nonwhite males is slightly greater than that for nonwhite females through age 34. Beyond this age the decreases recorded in the proportionate mortality are very small, and in some age decades there are actually small increases.

Under 15 Years of Age

The great decline in respiratory tuberculosis mortality in the past 21 years has been shared, in widely varying degree, by almost all age groups (fig. 4). The largest percentage decrease in rates, however, has taken place among children under the age of 15. While at no time in the past 21 years has this disease been an outstanding cause of mortality among children, deaths from this cause have decreased even more than the total deaths at these ages. The death rates in 1940 and 1948 are shown below in terms of the rates for 1930, which are shown as 100 in each case.

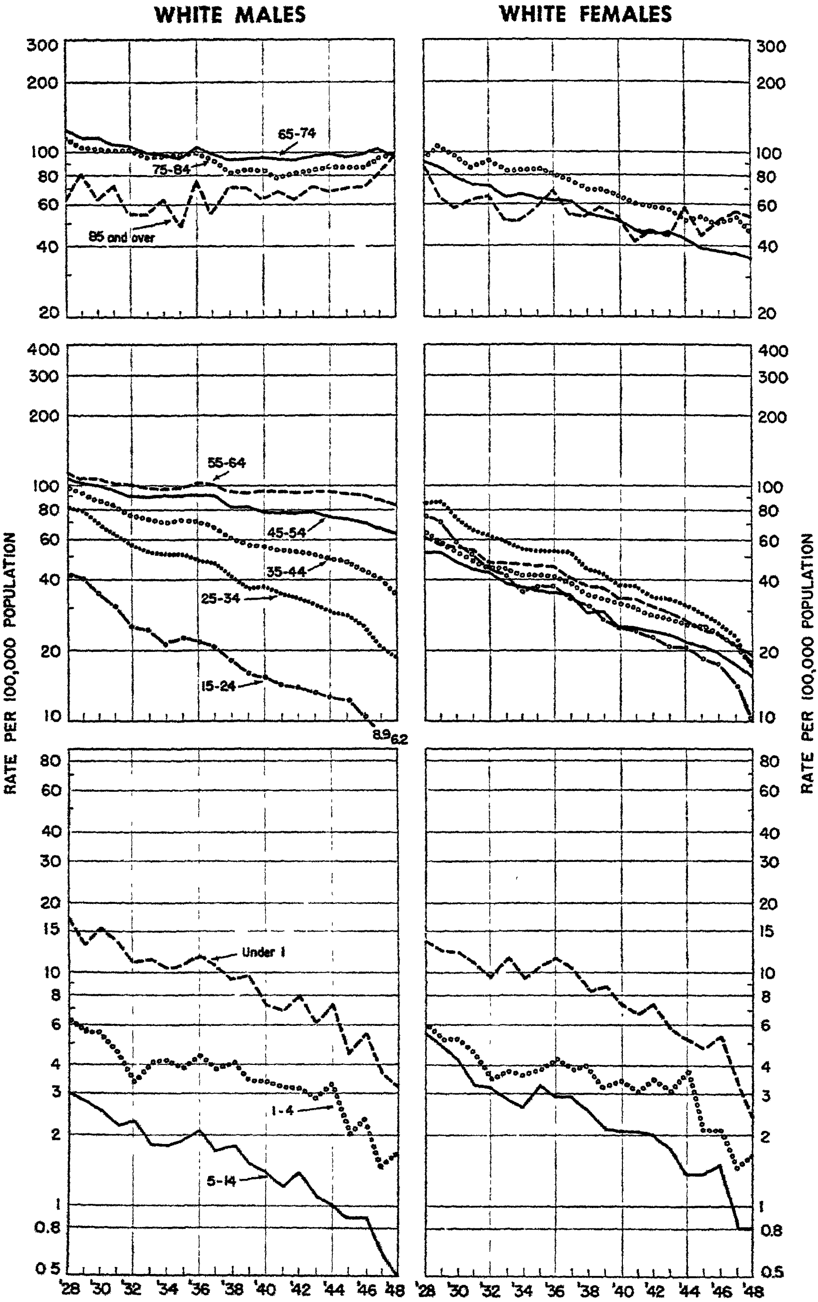

Figure 4a. Respiratory tuberculosis death rates for white males and white females by age: death registration States, 1928–48. (The rates for 1940–48 are computed from deaths, excluding those among the armed forces overseas, and population including the armed forces overseas.)

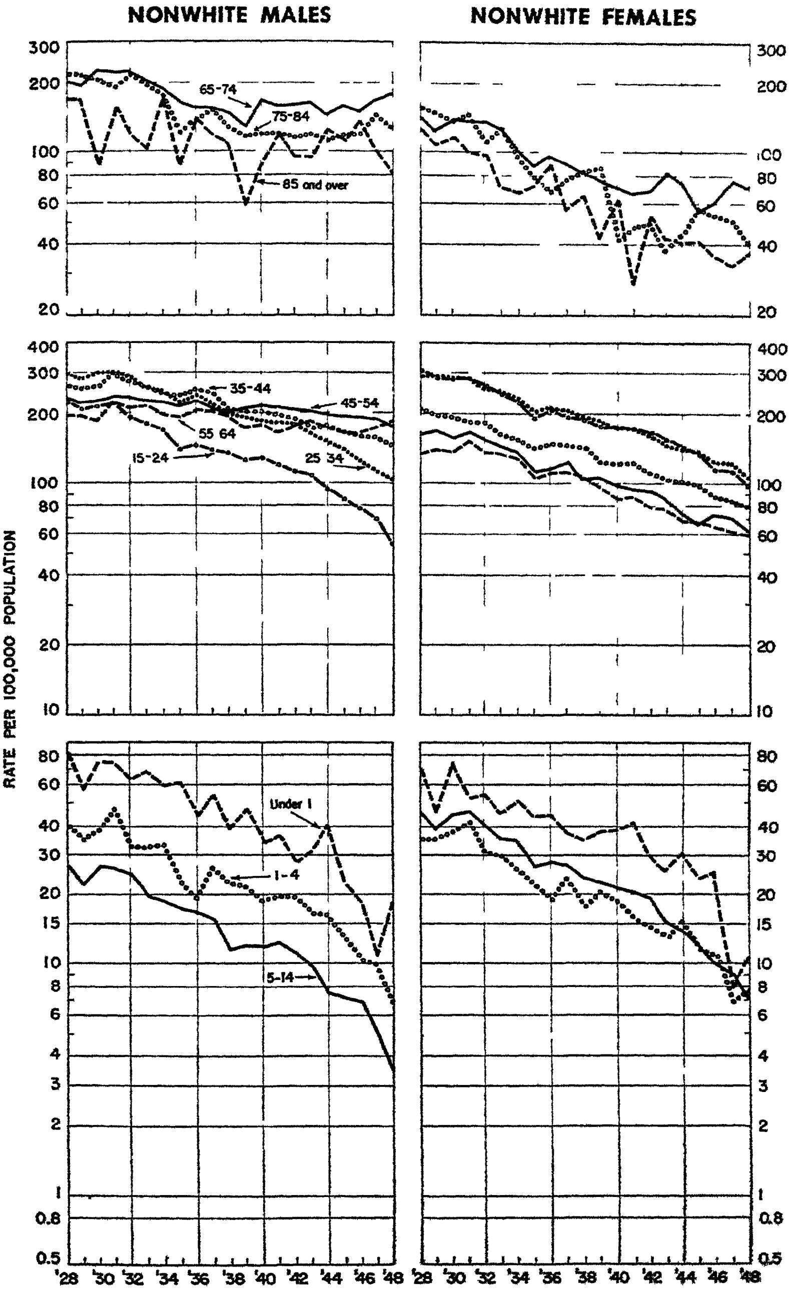

Figure 4b. Respiratory tuberculosis death rates for nonwhite males and nonwhite females by age: death registration States, 1928–48. (The rates for 1940–48 are computed from deaths, excluding those among the armed forces overseas, and population including the armed forces overseas).

Year	Age in years					
	White male			White female		
	Under 1	1-4	5-14	Under 1	1-4	5-14
1930	100	100	100	100	100	100
1940	48	62	54	60	65	49
1948	21	31	19	20	31	19
	Nonwhite male			Nonwhite female		
1930	100	100	100	100	100	100
1940	45	50	45	51	50	47
1948	25	19	13	14	20	16

As the charts show (fig. 4), the rates for nonwhite groups under 15 years of age continue to be more than four times the rates for white groups, despite the fact that the rates for nonwhite groups have declined faster than those for the white groups (except for the males under 1 year of age).

Ages 15–64

Mortality in this broad age span is characterized by a decline in the respiratory tuberculosis rates in each of the five age decades for the four race-sex groups over the past 21 years. As shown below by the ratios of the death rates for 1948 and 1940 to the respective 1930 rates, the decline was greatest for the white females in every age group. For the males, the rate of decline in tuberculosis mortality from 1930 to 1948 decreases in each successive age group. The decline in rates also slows down for the females in the older age groups, but not to the same extent. The ratios of the 1948 rates to those for 1930 are higher in every age group for the nonwhite than they are for the white population, emphasizing again the fact that the disparity between the rates in the two race groups for the ages 15–64 has not lessened between these years.

Year	Age in years									
	White males					White females				
	15–24	25–34	35–44	45–54	55–64	15–24	25–34	35–44	45–54	55–64
1930	100	100	100	100	100	100	100	100	100	100
1940	44	53	65	79	90	43	51	58	54	59
1948	18	25	40	61	76	17	23	34	32	34
	Nonwhite males					Nonwhite females				
1930	100	100	100	100	100	100	100	100	100	100
1940	60	62	78	95	97	62	63	64	63	62
1948	25	33	55	78	100	32	37	41	39	48

Ages 65 and Over

The trend of respiratory tuberculosis death rates among people 65 years of age and over for 1928 to 1948 contrasts sharply with the trends for all other ages. For white males over 65 the rate declined generally from 1928 to 1938, remained level in 1939 and 1940, and began to rise in 1941 with the rate of increase most rapid among males over 85. While it has been observed previously that the proportion of all deaths among persons over 65 due to respiratory tuberculosis is not large, the conspicuous change in trend should warrant exploration. The rates for nonwhite males also show a slight tendency to rise in the age groups 65–74, and 75–84. The respiratory tuberculosis death rates for white females continue their trend toward a slower decline with advancing age, seen before in the 15–64-year-olds. Among nonwhite females, there are so few deaths at ages over 65 that the rates are somewhat erratic; but again, the general trend is downward. The table below contrasts the 1940 and 1948 rate with the 1930 rate given as 100.

Year	Age in years					
	White male			White female		
	65–74	75–84	85 and over	65–74	75–84	85 and over
1930	100	100	100	100	100	100
1940	86	82	102	64	67	92
1948	87	97	154	45	49	94
	Nonwhite male			Nonwhite female		
1930	100	100	100	100	100	100
1940	74	58	99	51	32	55
1948	78	62	92	52	29	32

It is interesting to note that the tuberculosis death rate for men over 65 has shown a similar increase in England and Wales. The Registrar-General comments: "The lasting increase which took place in respiratory tuberculosis death-rates of men over 65, with absence of any improvement of their rate at 55–65, is in sharp contrast with what occurred amongst younger men and amongst women of all age-groups, and is a feature of the epidemiology of the disease which merits investigation." (*7*).

A new coding procedure (*8*), instituted in the United States in 1949, may lower the recorded tuberculosis death rate for white males over 65 by about 10 percent for that year. However, if this procedure were applied to data for past years, the trend of the death rate would still be in an upward direction, although the general level of the rates would be lowered.

Respiratory and Nonrespiratory Tuberculosis

Since 1910, nonrespiratory tuberculosis deaths have shown a gradual but pronounced tendency to constitute a smaller and smaller percentage of deaths from tuberculosis. In general, the death rate for the nonrespiratory forms has declined more rapidly than has the rate for respiratory tuberculosis. The death rate for tuberculosis of the respiratory system has dropped from a maximum of 134.2 per 100,000 population in 1911 to a minimum of 27.7 in 1948. In this same period, the rate for the nonrespiratory forms has declined from a maximum of 20.9 in 1911 to a minimum of 2.3 in 1948. The percentage decrease in the death rate for the nonrespiratory forms (89 percent) has been greater than that for the respiratory forms over the same period (79 percent).

Table 3. *Number of deaths and death rates for tuberculosis of the respiratory system and for other forms, by race and sex: United States, 1948*

[Exclusive of deaths among armed forces overseas. Rates per 100,000 estimated midyear population in each specified group, excluding armed forces overseas]

Race and sex	Respiratory tuberculosis		Nonrespiratory tuberculosis	
	Number	Rate	Number	Rate
All races	40,420	27.7	3,413	2.3
Male	26,593	36.7	1,959	2.7
Female	13,827	18.8	1,454	2.0
White	29,541	22.6	2,209	1.7
Male	20,354	31.3	1,262	1.9
Female	9,187	14.0	947	1.4
Nonwhite	10,879	70.6	1,204	7.8
Male	6,239	82.8	697	9.3
Female	4,640	58.9	507	6.4

Of the total number of tuberculosis deaths registered during 1948, 40,420, or 92.2 percent, were attributed to respiratory tuberculosis, and 3,413, or 7.8 percent, to the nonrespiratory forms of the disease (table 3). The death rate for respiratory tuberculosis alone was 27.7 per 100,000 population, while the rate for all other forms was 2.3. For both respiratory and nonrespiratory tuberculosis, similar relationships are maintained for the race-sex groups, with mortality higher among males than among females, and among nonwhites than among whites.

The relative difference in the rates by sex is considerably greater for respiratory than for nonrespiratory forms of the disease. The respiratory tuberculosis death rate for males in 1948 was 36.7, twice as great as the rate of 18.8 for females. For nonrespiratory tuberculosis, the death rate for males was 2.7, which was 35 percent more than the rate of 2.0 for females.

While the frequency of deaths from nonrespiratory tuberculosis has reached a very low point among whites, it is still of importance in

Table 4. *Number of deaths and death rates for nonrespiratory tuberculosis by age, race, and sex: United States, 1940, 1947, and 1948*

[Exclusive of deaths among armed forces overseas. Rates per 100,000 estimated midyear population in each specified group, excluding armed forces overseas]

Year, race, and sex	Total deaths [1]	Under 1 year	1-4 years	5-14 years	15-24 years	25-34 years	35-44 years	45-54 years	55-64 years	65-74 years	75-84 years	85 years and over	Not stated
	NUMBER												
All races, both sexes:													
1948	3,413	190	538	209	345	442	455	396	383	310	121	23	1
1947	3,602	224	470	249	458	459	453	452	391	304	127	14	1
1940	4,852	278	594	436	712	734	609	608	410	307	118	11	5
Male:													
1948	1,959	90	283	106	173	230	267	267	257	204	70	11	1
1947	2,027	112	245	122	215	247	265	301	261	192	60	6	1
1940	2,650	148	318	239	342	378	350	361	271	171	66	4	2
Female:													
1948	1,454	100	255	103	172	212	188	129	126	106	51	12	-------
1947	1,575	112	225	127	243	212	188	151	130	112	67	8	-------
1940	2,202	130	276	197	370	356	259	247	169	136	52	7	3
White, both sexes:													
1948	2,209	110	370	138	168	224	255	261	288	268	106	20	1
1947	2,279	153	316	134	193	245	267	286	305	251	116	13	-------
1940	3,323	185	406	270	381	428	405	468	383	271	112	10	1
Male:													
1948	1,262	47	193	67	83	106	156	178	188	173	62	8	1
1947	1,296	77	166	64	93	134	151	196	193	163	53	6	-------
1940	1,831	96	211	148	179	219	246	278	210	147	62	4	1
Female:													
1948	947	63	177	71	85	118	99	83	100	95	41	12	-------
1947	983	76	150	70	100	111	116	90	112	88	63	7	-------
1940	1,492	89	195	122	202	209	159	190	143	127	50	6	-------
Nonwhite, both sexes:													
1948	1,204	80	168	71	177	218	200	135	95	42	15	3	-------
1947	1,323	71	154	115	265	214	186	166	86	53	11	1	1
1940	1,529	93	188	166	331	306	204	140	57	33	6	1	4
Male:													
1948	697	43	90	39	90	124	111	80	69	31	8	3	-------
1947	731	35	79	58	122	113	114	105	68	29	7	-------	1
1940	819	52	107	91	163	159	104	83	31	24	4	-------	1
Female:													
1948	507	37	78	32	87	91	89	46	26	11	7	-------	-------
1947	592	36	75	57	143	101	72	61	18	24	4	1	-------
1940	710	41	81	75	168	147	100	57	26	9	2	1	3

See footnote at end of table.

Table 4. *Number of death and death rates for nonrespiratory tuberculosis by age, race, and sex: United States, 1940, 1947, and 1948*—Continued

Year, race and sex	Total deaths[1]	Under 1 year	1-4 years	5-14 years	15-24 years	25-34 years	35-44 years	45-54 years	55-64 years	65-74 years	75-84 years	85 years and over	Not stated
	RATE												
All races, both sexes:													
1948	2.3	5.9	4.5	0.9	1.5	1.9	2.2	2.3	2.9	4.1	4.0	5.2	----------
1947	2.5	6.4	4.2	1.1	2.0	2.0	2.3	2.7	3.1	4.1	4.4	3.2	----------
1940	3.7	13.7	6.9	1.9	3.0	3.4	3.3	3.9	4.1	4.8	5.1	2.9	----------
Male:													
1948	2.7	5.4	4.7	.9	1.5	2.1	2.7	3.2	3.9	5.6	5.1	5.8	----------
1947	2.8	6.2	4.3	1.1	1.9	2.2	2.7	3.6	4.1	5.4	4.5	3.2	----------
1940	4.0	14.4	7.3	2.1	2.9	3.6	3.8	4.5	5.0	5.4	6.0	2.5	----------
Female:													
1948	2.0	6.3	4.4	.9	1.5	1.8	1.8	1.5	1.9	2.7	3.1	4.7	----------
1947	2.2	6.5	4.1	1.1	2.1	1.8	1.8	1.8	2.1	3.0	4.3	3.2	----------
1940	3.3	13.1	6.6	1.8	3.1	3.3	2.8	3.3	3.2	4 3	4.3	3.3	----------
White, both sexes:													
1948	1.7	3.8	3.6	.7	.8	1.1	1.4	1.7	2.4	3.8	3.8	5.1	----------
1947	1.8	4.9	3.3	.7	1.0	1.2	1.5	1.9	2.6	3.7	4.3	3.3	----------
1940	2.8	10.4	5.4	1.4	1.8	2.2	2.5	3.3	3.9	4.6	5.2	3.0	----------
Male:													
1948	1.9	3.2	3.6	.6	.8	1.1	1.7	2 3	3.1	5.1	4.8	4.7	----------
1947	2.0	4.8	3.3	.6	.9	1.3	1.7	2.6	3.2	4.9	4.3	3.6	----------
1940	3.1	10.6	5.5	1.5	1.7	2.3	3.0	3.8	4.8	5.0	6.0	2.8	----------
Female:													
1948	1.4	4.5	3.5	.7	.8	1.1	1.1	1.1	1.7	2.6	2.9	5.4	----------
1947	1.5	5.0	3.2	.7	1.0	1.1	1.3	1.2	1.9	2.5	4.4	3.2	----------
1940	2.5	10.2	5.3	1.3	1.9	2.2	1.9	2.7	2.9	4.2	4.4	3.1	----------
Nonwhite, both sexes:													
1948	7.8	21.4	11.5	2.3	6.6	8.9	9.9	8.6	10.0	8.6	7.4	5.5	----------
1947	8.8	18.3	11.2	3.8	9.9	8.8	9.3	10.9	9 3	11.1	5.7	2.0	----------
1940	11.3	38.5	17.5	6.0	12.6	13.7	10.8	10.7	7.2	8.0	4.3	2.6	----------
Male:													
1948	9.3	22.9	12.3	2.5	6.8	10.8	11.6	11.7	14.3	12.3	8.2	13.6	----------
1947	9.9	18.0	11.5	3.8	9.3	10.0	12.0	14.1	14.4	11.7	7.6	0	----------
1940	12.3	43.4	20.0	6.6	13.1	15.0	11.3	12.4	7.4	11.2	6.0	0	----------
Female:													
1948	6.4	19.9	10.6	2.0	6.4	7.2	8.3	5.7	5.6	4.7	6.7	0	----------
1947	7.7	18.7	10.9	3.8	10.4	7.8	6.8	7.8	4.0	10.4	4.0	3.3	----------
1940	10.3	33.6	15.0	5.4	12 2	12.5	10.3	9.0	7.0	4.6	2.8	4.5	----------

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[1] Includes deaths for which age was not stated.

the nonwhite population. In 1948, the death rate for nonrespiratory tuberculosis was 1.7 per 100,000 population for whites, whereas among nonwhites it was 7.8, more than four and one-half times as large. This race differential is greater than that seen for respiratory tuberculosis, where the death rate for nonwhites in 1948 is 70.6, a little over three times the rate of 22.6 for whites. The number of deaths and the death rates for nonrespiratory tuberculosis by age, race, and sex are shown for the United States for the years 1940, 1947, and 1948 in table.

Table 5 shows the number of deaths, the death rates and the percentage distribution of the various specific forms of tuberculosis for 1948. Although the deaths from nonrespiratory tuberculosis have constituted a smaller and smaller part of all tuberculosis deaths over the course of the years, the bulk of the nonrespiratory deaths are still in the classifications of disseminated tuberculosis and tuberculosis of the meninges and central nervous system. In 1948, 28.5 percent were classified as disseminated tuberculosis and 30.7 percent as tuberculosis of the meninges and central nervous system. An additional third (32.5 percent), resulted from tuberculosis of the intestines and peritoneum, of the vertebral column, and of the genito-urinary system. In interpreting these figures, it is important to note that they represent only a part of the total number of deaths in which nonrespiratory involvement is mentioned on the death certificate. The problem of primary cause selection, and joint-cause classification which occurs when more than one cause of death is reported on the death certificate has been discussed in a previous paper (*6*).

Table 5. *Number of deaths and death rates for tuberculosis by specified form: United States, 1948*

[Exclusive of deaths among armed forces overseas. Rates per 100,000 estimated midyear population in excluding armed forces overseas]

Cause of death	Number of deaths	Percent of total	Death rate
Tuberculosis (all forms)	43,833	100.0	30.0
Tuberculosis of the respiratory system	40,420	92.2	27.7
Tuberculosis (other forms)	3,413	7.8	2.3
Tuberculosis of the meninges and central nervous system	1,048	2.4	0.7
Tuberculosis of the intestines and peritoneum	382	0.9	0.3
Tuberculosis of the vertebral column	399	0.9	0.3
Tuberculosis of the bones and joints (except vertebral column)	101	0.2	0.1
Tuberculosis of the skin and subcutaneous cellular tissue	18	(*)	(*)
Tuberculosis of the lymphatic system (except bronchial, mediastinal, mesenteric, and retroperitoneal lymph nodes)	66	0.2	(*)
Tuberculosis of the genito-urinary system	327	0.7	0.2
Tuberculosis of other organs	101	0.2	0.1
Disseminated tuberculosis	971	2.2	0.7

*Less than 0.05.

Tuberculosis Mortality Among Nonwhite Groups

Table 6 presents the number of deaths and the death rates for tuberculosis (all forms) from 1940 to 1948 for the nonwhite population and the principal race groups under the nonwhite classification.

The total number of deaths among nonwhites in 1948 was 12,083. Of these, 92.9 percent occurred among Negroes, 4.9 percent among Indians, and the remaining 2.2 percent among Chinese, Japanese, and other racial groups.

The tuberculosis death rate for all nonwhites in 1948 was 78.4 per 100,000 population. The rates for the several nonwhite race groups ranged from 58.0 and 76.3 for Japanese and Negroes to 143.2 and 166.7 for Indians and Chinese, respectively. The rate for Chinese was more than twice as high as that for Negroes, and six times as high as the rate for the white population. Beginning with 1945, the tuberculosis death rates for all the nonwhite race groups have presented a pattern of steady decrease, similar to that for the white race.

In interpreting the differences in the rates for the several nonwhite groups, a number of factors should be taken into consideration. These rates are based on estimated population figures, which for postcensal years, may contain errors that are relatively large for small population groups. The comparability of the death rates is further limited by differences in the age-sex composition of the population among the specified races, and the completeness with which deaths are registered. The 1940 enumeration of the population showed considerable variation

Table 6. *Number of deaths and death rates for tuberculosis (all forms) for nonwhites by specified race: United States, 1940–48*

Exclusive of deaths among armed forces overseas. Rates per 100,000 estimated midyear population in each specified group, excluding armed forces overseas]

Race and year	Number	Rate	Race and year	Number	Rate
Nonwhite total:			Chinese:		
1948	12,083	78.4	1948	145	166.7
1947	13,281	88.1	1947	165	191.9
1946	13,571	92.3	1946	215	265.4
1945	14,293	102.6	1945	210	287.7
1944	14,773	106.2	1944	229	309.5
1943	15,796	112.9	1943	224	290.9
1942	16,384	118.4	1942	199	258.4
1941	16,968	124.2	1941	203	263.6
1940	17,217	127.6	1940	208	266.7
Negro:			Japanese:		
1948	11,222	76.3	1948	76	58.0
1947	12,271	85.2	1947	92	71.9
1946	12,421	88.4	1946	98	79.7
1945	13,114	98.4	1945	116	101.8
1944	13,538	101.8	1944	128	105.8
1943	14,513	108.4	1943	138	112.2
1942	15,107	114.2	1942	142	117.4
1941	15,702	120.2	1941	137	112.3
1940	15,883	123.1	1940	144	113.4
Indian:			Other:		
1948	590	143.2	1948	50	73.5
1947	695	173.3	1947	58	96.7
1946	771	198.7	1946	66	120.0
1945	777	212.3	1945	76	138.2
1944	798	221.1	1944	80	148.1
1943	823	229.9	1943	98	184.9
1942	836	238.9	1942	100	196.1
1941	836	243.0	1941	90	180.0
1940	867	258.0	1940	115	230.0

in age distribution among the race groups. Furthermore, there was a marked preponderance of males among the Chinese and the "other nonwhite" groups. These age-sex distributions may have been changed somewhat by the increasing birth rate since 1940, and by selective migration. In addition, the death rates by race for the war years, computed for the population present in the country, were influenced by the changes in population composition resulting from the withdrawal of young men for duty with the armed forces overseas.

Quantitative data on the completeness with which deaths are registered are almost completely lacking. However, the indications afforded by extraordinarily low death rates recorded for some areas, and the results of a test of completeness of birth registration made in 1940, suggest that deaths of nonwhites are less completely registered than those of whites. Consequently, the recorded rates may be interpreted as a minimum statement of the seriousness of the tuberculosis problem among the nonwhite races.

Death Rates by State

The rapid decline in the tuberculosis death rate for the United States since 1940 has been shared by all the States. For 11 States, the rates declined between 20 and 30 percent (table 7), from the 1939–41 average; for 21 States and the District of Columbia, between 30 and 40 percent; and for 16 States more than 40 percent. The States which have made the greatest progress include several which had very high, and several which had very low rates in 1939–41. Tennessee and Iowa each recorded a reduction of over 40 percent between 1939–41 and 1948. There seems to be no indication at present that the tuberculosis rate is leveling off, even for States with very low rates.

Except for Arizona with its high rate of 82.4, the rates for residents of the various States in 1948 ranged from 9.5 for Iowa to 53.1 per 100,000 population for New Mexico. Only six States, Arizona, New Mexico, Tennessee, Maryland, Kentucky, Nevada, and the District of Columbia now have rates of over 40. In 1939–41, the lowest rate was 15.5 (Utah) and the highest (again excepting Arizona) 78.5 for Tennessee.

The geographic distribution by States of the 1948 tuberculosis death rates is shown in figure 5. One-quarter of the States have rates which are below 20 per 100,000 population, and more than half have rates below 30. However, there has been little change in the relative rank of the States when they are arrayed in quartiles. The States having the 12 highest rates form a band that stretches across the Southwest along the southern border of the country to the Mississippi, and thence northeast through Tennessee, Kentucky, and Virginia, to include the District of Columbia, Maryland, Delaware, and New York. In general, the States in the third quartile are contiguous to those in the

Table 7. *Number of deaths from tuberculosis (all forms), death rates and percentage change in rates: United States and each State, 1939–41 average, 1947 and 1948*

[By place of residence. Exclusive of deaths among armed forces overseas. Rates per 100,000 estimated total midyear population present in area]

Area	Number			Rate			Percentage change in rate
	1948	1947	1939–41 average	1948	1947	1939–41 average [1]	1939–41 to 1948
United States	43,833	48,064	60,429	30 0	33.5	45.8	−34.5
Alabama	1,022	1,147	1,518	35.2	40.5	53.7	−34.5
Arizona	580	644	724	82.4	100.0	141.9	−41.9
Arkansas	727	802	1,009	37.5	41.9	51.7	−27.5
California	3,301	3,455	3,838	31.9	35.2	54.5	−41.5
Colorado	362	375	503	30.2	32.8	44.5	−32.1
Connecticut	528	504	616	26.5	25.5	36.1	−26.6
Delaware	119	132	152	39.7	45.4	56.7	−30.0
District of Columbia	441	497	548	51.1	57.7	78.3	−34.7
Florida	745	793	944	30.7	34.1	49.0	−37.3
Georgia	1,002	1,054	1,510	31.6	33.6	48.0	−34.2
Idaho	70	71	99	11.9	13.5	19.0	−37.4
Illinois	2,658	2,842	3,663	31.8	33.8	46.5	−31.6
Indiana	917	1,083	1,398	23.4	28.2	40.6	−42.4
Iowa	249	307	450	9.5	11.8	17.8	−46.6
Kansas	252	322	423	13.3	16.7	23.4	−43.2
Kentucky	1,290	1,472	1,961	45.2	52.9	69.4	−34.9
Louisiana	947	986	1,347	36.5	38.8	56.4	−35.3
Maine	197	193	268	21.9	21.8	31.7	−30.9
Maryland	1,010	1,172	1,268	46.9	54.8	68.7	−31.7
Massachusetts	1,373	1,586	1,623	29.6	34.2	37.4	−20.9
Michigan	1,590	1,675	1,828	25.6	27.6	34.8	−26.4
Minnesota	492	579	758	16.8	20.0	27.2	−38.2
Mississippi	666	729	1,074	31.5	34.8	48.5	−35.1
Missouri	1,016	1,291	1,783	26.1	33.1	46.9	−44.3
Montana	146	152	235	28.6	31.1	42.3	−32.4
Nebraska	167	199	225	13.0	15.5	17.3	−24.9
Nevada	72	44	70	43.9	31.7	62.2	−29.4
New Hampshire	72	83	133	13.8	15.5	27.1	−49.1
New Jersey	1,393	1,555	1,852	29.2	33.6	44.6	−34.5
New Mexico	303	330	357	53.1	60.3	67.0	−20.7
New York	5,128	5,286	6,244	36.0	37.3	46.5	−22.6
North Carolina	949	1,128	1,598	25.0	30.5	44.4	−43.7
North Dakota	62	88	127	10.7	16.3	20.1	−46.8
Ohio	2,145	2,377	2,913	27.4	31.0	42.2	−35.1
Oklahoma	606	701	1,104	26.4	30.7	49.3	−46.5
Oregon	249	314	307	15.2	20.3	27.7	−45.1
Pennsylvania	3,076	3,467	4,231	29.4	33.0	42.8	−31.3
Rhode Island	199	233	265	26.7	31.3	37.5	−28.8
South Carolina	547	557	876	27.6	28.5	45.7	−39.6
South Dakota	113	167	197	18.5	28.9	31.2	−40.7
Tennessee	1,423	1,544	2,298	44.8	50.0	78.5	−42.9
Texas	2,634	2,791	3,814	35.7	39.3	59.1	−39.6
Utah	69	80	86	10.3	12.5	15.5	−33.5
Vermont	115	119	144	31.7	32.5	40.4	−21.5
Virginia	1,087	1,244	1,628	35.6	41.5	59.4	−40.1
Washington	598	592	689	24.3	25.1	39.2	−38.0
West Virginia	622	683	880	32.5	36.3	46.2	−29.7
Wisconsin	474	585	806	14.4	18.0	25.8	−44.2
Wyoming	30	34	45	10.5	12.8	17.5	−40.0

[1] Based on average 1939–41 population.

fourth. The lowest rates were found in the West North Central and in the northwest Mountain States.

Many factors must be considered in evaluating the differences in crude death rates among States, or in time trends for one State. The

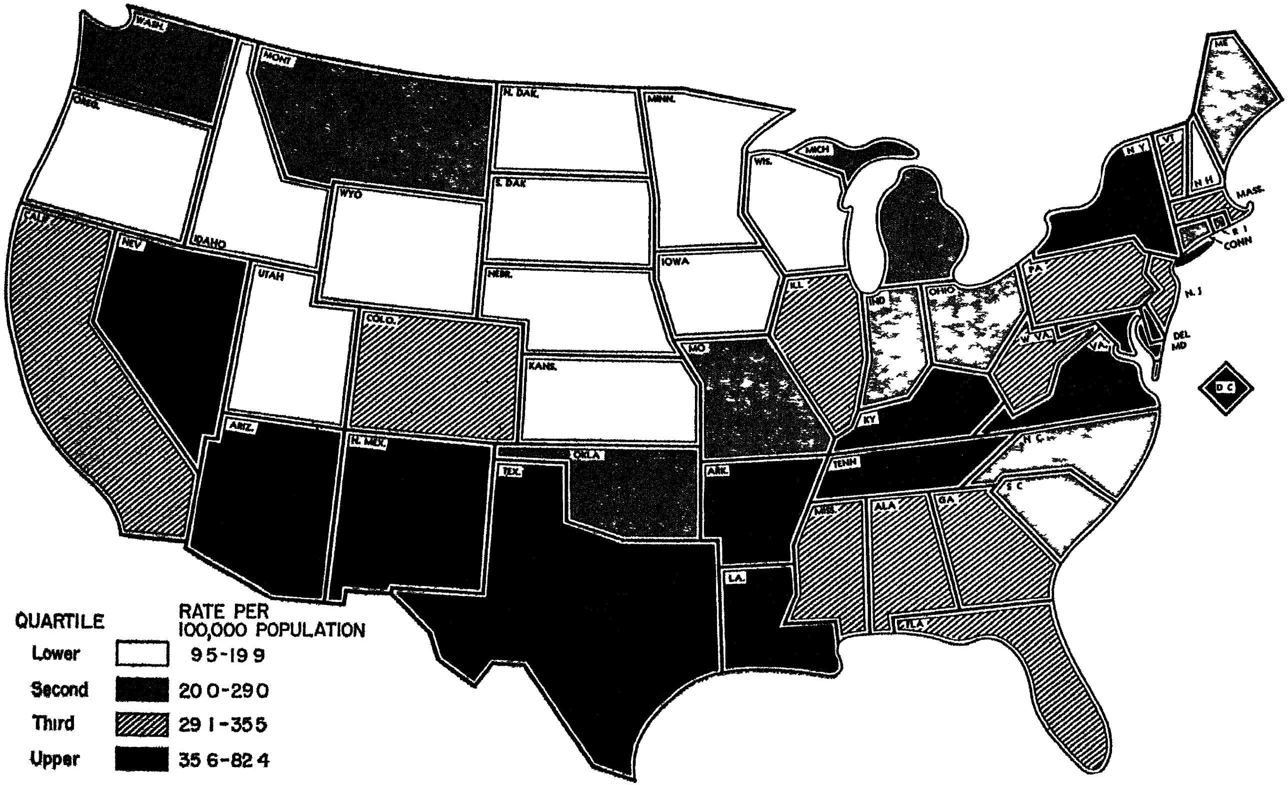

Figure 5. Death rates for tuberculosis (all forms) by State. United States, 1948.

Table 8. *Number of deaths from tuberculosis (all forms) by place of occurrence and by place of residence, and percentage difference: each State, 1948*

Area	Deaths recorded in area	Deaths of residents of area	Percentage difference
Alabama	1,009	1,022	+1.3
Arizona	673	580	−13.8
Arkansas	681	727	+6.8
California	3,309	3,301	−0.2
Colorado	420	362	−13.8
Connecticut	516	528	+2.3
Delaware	117	119	+1.7
District of Columbia	328	441	+34.5
Florida	727	745	+2.5
Georgia	970	1,002	+3.3
Idaho	65	70	+7.7
Illinois	2,613	2,658	+1.7
Indiana	898	917	+2.1
Iowa	239	249	+4.2
Kansas	242	252	+4.1
Kentucky	1,281	1,290	+0.7
Louisiana	993	947	−4.6
Maine	191	197	+3.1
Maryland	1,107	1,010	−8.8
Massachusetts	1,390	1,373	−1.2
Michigan	1,571	1,590	+1.2
Minnesota	507	492	−3.0
Mississippi	633	666	+5.2
Missouri	1,046	1,016	−2.9
Montana	133	146	+9.8
Nebraska	166	167	+0.6
Nevada	56	72	+28.6
New Hampshire	67	72	+7.5
New Jersey	1,358	1,393	+2.6
New Mexico	312	303	−2.9
New York	5,159	5,128	−0.6
North Carolina	999	949	−5.0
North Dakota	56	62	+10.7
Ohio	2,133	2,145	+0.6
Oklahoma	587	606	+3.2
Oregon	236	249	+5.5
Pennsylvania	3,083	3,076	−0.2
Rhode Island	200	199	−0.5
South Carolina	543	547	+0.7
South Dakota	122	113	−7.4
Tennessee	1,478	1,423	−3.7
Texas	2,600	2,634	+1.3
Utah	63	69	+9.5
Vermont	114	115	+0.9
Virginia	1,061	1,087	+2.5
Washington	612	598	−2.3
West Virginia	632	622	−1.6
Wisconsin	505	474	−6.1
Wyoming	32	30	−6.2

crude death rate makes no allowance for the differences in age, race, and sex composition of the population of the several States; or for changes produced in that composition from year to year through interstate migration, which has been especially large since 1940. All rates in postcensal years are based on population estimates. It should be noted that for several States, a change in the method of estimating State populations may account for part of the difference between the rates for 1947 and 1948. Additional factors which tend to limit the comparability of State rates are the varying degree of completeness of death registration among the States, and differences in the completeness and accuracy of medical certification of death.

The rates for several States are also affected by selective migration of tuberculous persons. The percentage differences between the deaths occurring in an area, and the deaths of residents of an area, shown for 1948 in table 8, give some indication of the size of this movement. By definition, persons who remain in a State for 1 year or more are classified as residents of that State. Deaths in nonresident institutions (including tuberculosis sanatoria) follow the same rule. Thus the numbers of deaths by residence are adjusted for movements of less than one year's duration, but not for migrations of longer standing.

Table 9 shows, by States, the number of tuberculosis deaths (all forms), the number of respiratory tuberculosis deaths, the number and percent of nonrespiratory tuberculosis deaths, and the death rates for respiratory and nonrespiratory tuberculosis in 1948.

Because the number of deaths from nonrespiratory tuberculosis is small, differences in the death rates among States or from year to year for any State may not always reflect a change in mortality risk.

Deaths in Institutions

Of the 40,420 deaths from respiratory tuberculosis in the United States in 1948, 68.6 percent occurred in institutions. This number is about 1 percent more than the proportion (67.9 percent) recorded in 1947, and reflects a continuation of the trend toward increased frequency of institutional deaths from this disease.

Table 10 shows, for the United States and each State, the number of deaths from respiratory tuberculosis which occurred outside of institutions and the number which occurred in institutions, by type of institution.

The 1948 proportions of respiratory tuberculosis deaths in institutions varied widely among the States, ranging from 27.0 percent for residents of Mississippi to 89.0 for those of Minnesota. The proportion of institutional deaths was lowest for residents of five southern States: Mississippi, Kentucky, Tennessee, Alabama, and Texas. For these areas, more than 59 percent of the deaths from respiratory tuberculosis occurred at home. The largest percentage of deaths in institutions (over 85 percent) was recorded for residents of the States of Washington, Michigan, Minnesota, New York and Wisconsin.

The data shown in table 10 can, if enough additional information is available, be useful in evaluating the adequacy of tuberculosis hospital facilities in an area. But it must be remembered that the data contain some serious limitations and therefore cannot be considered conclusive. For instance, the fact of the occurrence of a death in an insti-

Table 9. *Number of deaths and death rates for tuberculosis of the respiratory system and for other forms: United States and each State, 1948*

[By place of residence. Exclusive of deaths among armed forces overseas. Rates per 100,000 estimated total midyear population present in area]

Area	Tuberculosis (all forms)	Tuberculosis of respiratory system	Tuberculosis (other forms)		Rate per 100,000 population	
			Number	Percent of tuberculosis (all forms)	Tuberculosis of respiratory system	Tuberculosis (other forms)
United States	43,833	40,420	3,413	7.8	27.7	2.3
Alabama	1,022	937	85	8.3	32.3	2.9
Arizona	580	538	42	7.2	76.4	6.0
Arkansas	727	690	37	5.1	35.6	1.9
California	3,301	3,070	231	7.0	29.7	2.2
Colorado	362	335	27	7.5	27.9	2.3
Connecticut	528	488	40	7.6	24.5	2.0
Delaware	119	107	12	10.1	35.7	4.0
District of Columbia	441	376	65	14.7	43.6	7.5
Florida	745	713	32	4.3	29.3	1.3
Georgia	1,002	924	78	7.8	29.2	2.5
Idaho	70	62	8	11.4	10.6	1.4
Illinois	2,658	2,438	220	8.3	29.2	2.6
Indiana	917	817	100	10.9	20.9	2.6
Iowa	249	231	18	7.2	8.8	.7
Kansas	252	235	17	6.7	12.4	.9
Kentucky	1,290	1,186	104	8.1	41.5	3.6
Louisiana	947	894	53	5.6	34.5	2.0
Maine	197	178	19	9.6	19.8	2.1
Maryland	1,010	955	55	5.4	44.3	2.6
Massachusetts	1,373	1,277	96	7.0	27.5	2.1
Michigan	1,590	1,423	167	10.5	22.9	2.7
Minnesota	492	444	48	9.8	15.1	1.6
Mississippi	666	623	43	6.5	29.5	2.0
Missouri	1,016	950	66	6.5	24.4	1.7
Montana	146	136	10	6.8	26.6	2.0
Nebraska	167	152	15	9.0	11.8	1.2
Nevada	72	63	9	12.5	38.4	5.5
New Hampshire	72	62	10	13.9	11.9	1.9
New Jersey	1,393	1,299	94	6.7	27.2	2.0
New Mexico	303	269	34	11.2	47.1	6.0
New York	5,128	4,799	329	6.4	33.7	2.3
North Carolina	949	882	67	7.1	23.2	1.8
North Dakota	62	54	8	12.9	9.3	1.4
Ohio	2,145	1,953	192	9.0	24.9	2.4
Oklahoma	606	568	38	6.3	24.7	1.7
Oregon	249	225	24	9.6	13.7	1.5
Pennsylvania	3,076	2,793	283	9.2	26.7	2.7
Rhode Island	199	185	14	7.0	24.8	1.9
South Carolina	547	506	41	7.5	25.5	2.1
South Dakota	113	99	14	12.4	16.2	2.3
Tennessee	1,423	1,308	115	8.1	41.1	3.6
Texas	2,634	2,421	213	8.1	32.8	2.9
Utah	69	59	10	14.5	8.8	1.5
Vermont	115	109	6	5.2	30.0	1.7
Virginia	1,087	999	88	8.1	32.7	2.9
Washington	598	541	57	9.5	22.0	2.3
West Virginia	622	585	37	5.9	30.6	1.9
Wisconsin	474	440	34	7.2	13.3	1.0
Wyoming	30	22	8	26.7	7.7	2.8

tution is not evidence that the decedent was hospitalized for any significant period of time. As a matter of fact a 10-percent sample of deaths, taken in 1945, showed that approximately 20 percent of

Table 10. *Number of deaths from respiratory tuberculosis in institutions, by type of institution: United States and each State, 1948*

[By place of residence. Exclusive of deaths among armed forces overseas]

Area	Total	Deaths not in institutions	Deaths in institutions	Type of institution			
				General hospital	Tuberculosis hospital	Nervous and mental hospitals	Other and unknown institutions
United States	40,420	12,702	27,718	11,096	12,019	3,546	1,057
Alabama	937	572	365	126	180	47	12
Arizona	538	213	325	216	83	12	14
Arkansas	690	351	339	81	217	40	1
California	3,070	487	2,583	1,544	713	223	103
Colorado	335	79	256	158	68	15	15
Connecticut	488	110	378	107	165	56	50
Delaware	107	30	77	23	50	3	1
District of Columbia	376	57	319	193	112	14	---
Florida	713	186	527	174	280	37	36
Georgia	9,924	456	468	123	214	124	7
Idaho	62	27	35	15	6	6	8
Illinois	2,438	409	2,029	845	869	285	30
Indiana	817	310	507	166	237	82	22
Iowa	231	51	180	39	86	47	8
Kansas	235	79	156	46	81	25	4
Kentucky	1,186	803	383	108	193	67	15
Louisiana	894	397	497	309	106	63	19
Maine	178	54	124	43	63	17	1
Maryland	955	302	653	260	328	51	14
Massachusetts	1,277	205	1,072	323	555	151	43
Michigan	1,423	183	1,240	386	644	102	108
Minnesota	444	49	395	122	192	76	5
Mississippi	623	455	168	55	56	47	10
Missouri	950	279	671	279	338	39	15
Montana	136	51	85	44	33	5	3
Nebraska	152	35	117	44	38	31	4
Nevada	63	17	46	36	10	---	---
New Hampshire	62	13	49	8	32	5	4
New Jersey	1,299	198	1,101	286	613	178	24
New Mexico	269	114	155	96	52	6	1
New York	4,799	644	4,155	1,952	1,593	464	146
North Carolina	882	328	554	77	360	106	11
North Dakota	54	9	45	8	25	10	2
Ohio	1,953	563	1,390	538	672	137	43
Oklahoma	568	275	293	86	131	66	10
Oregon	225	41	184	53	81	39	11
Pennsylvania	2,793	814	1,979	944	631	278	126
Rhode Island	185	41	144	27	58	33	26
South Carolina	506	157	349	37	243	68	1
South Dakota	99	31	68	28	30	10	---
Tennessee	1,308	844	464	142	243	66	13
Texas	2,421	1,439	982	395	420	134	33
Utah	59	21	38	18	20	---	---
Vermont	109	39	70	18	39	13	---
Virginia	999	460	539	190	236	80	24
Washington	541	65	476	162	225	73	16
West Virginia	585	288	297	57	163	72	5
Wisconsin	440	59	381	93	232	43	13
Wyoming	22	12	10	7	3	---	---

the persons who died of respiratory tuberculosis in institutions were hospitalized less than 2 weeks; about 50 percent were hospitalized less than 2 months (*4*). By the same token, neither is the occurrence of a death outside of an institution evidence that the decedent was never hospitalized.

With these reservations in mind, however, it is obvious that the larger the proportion of tuberculosis deaths which occur in hospitals, the smaller the likelihood of the disease's spread in the community.

The distribution of deaths by type of institution is substantially the same for the United States as a whole in 1948 as it was in 1947. In some States the percentage distributions for these two years show marked differences. However, since the reasons for the differences are in most cases inherent in the nature of the policies and facilities of the individual States, no detailed analysis of the variation will be discussed here.

Population Data

All death rates presented in this report have been computed on the basis of midyear population estimates provided by the Bureau of the Census. For 1900–1939, the population estimates for the United States by age, race, and sex, have been published in "Vital Statistics Rates in the United States, 1900–1940." The total figures for the United States have been made available in "Current Population Reports, Population Estimates" Series P–25, No. 27 for 1940–48. The United States estimates by age, race, and sex are published for 1940–45 in "Population-Special Reports," Series P–47, No. 3; for 1946, in "Current Population Reports, Population Estimates, "Series P–25, No. 21; and for 1947 and 1948, in Series P–25, No. 39.. The estimates of the population in the age groups 75–84, and 85 and over, for 1940–48, and the estimates for the specific nonwhite race groups have not been published.

The State population estimates are shown in "Current Population Reports, Population Estimates," Series P–25, No. 12 for 1940–47 and for 1948 in Series P–25, No. 26.

Summary

This report, the seventh of an annual series, presents data on deaths and death rates for tuberculosis in the United States and in each State for 1948, 1947, and for the prewar period, 1939–41. The trend of the death rates by age is discussed for the 21-year period, 1928–48.

There were 43,833 deaths from tuberculosis (all forms) in the United States in 1948. The death rate was 30.0 per 100,000 population, which was 10 percent below the rate of 33.5 for 1947. The death rates for both sexes in the white and nonwhite population groups have continued their decline, with the rates for females falling faster than those for males. The 1948 rates were 33.3 for white males, 15.4 for white females, 92.1 for nonwhite males and 65.4 for nonwhite females.

The rates for the principal nonwhite groups ranged from 58.0 and 76.3 for Japanese and Negroes to 143.2 and 166.7 for Indians and Chinese.

Of the total deaths from tuberculosis in 1948, 92.2 percent were from tuberculosis of the respiratory system and 7.8 percent from the nonrespiratory forms of the disease. The rate for respiratory tuberculosis was 27.7, and for all other forms, 2.3.

The death rates for tuberculosis (all forms) by State of residence, ranged from 9.5 for Iowa to 53.1 for New Mexico, and 82.4 for Arizona.

In 1948, the proportion of respiratory tuberculosis deaths which occurred in institutions was 68.6 percent for the United States. The lowest proportion (27.0 percent) was found in Mississippi, while the highest (89.0 percent), was in Minnesota.

When the respiratory rates for the past 21 years are examined by age, race, and sex, it is found that the largest relative declines occurred among children. Smaller declines have taken place up to age 65. Beyond this age, however, small but consistent increases are apparent in the death rates for both white and nonwhite males beginning with 1941. On the other hand, the rates for females over 65 have continued to decline.

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(*7*) The Registrar General's Statistical Review of England and Wales for the Six Years 1940–1945. Text, vol. 1, Medical. London, His Majesty's Stationery Office, 1949, p. 110.

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ANNOUNCEMENT

Courses in Laboratory Diagnosis of Tuberculosis

A 1-week course for laboratory directors, senior staff members, and physicians in the laboratory diagnosis of tuberculosis will be given June 5–9, 1950, at the Laboratory Services of the Communicable Disease Center. In addition, a 3-week course for laboratory personnel in the laboratory diagnosis of tuberculosis will be offered August 21 to September 8, and a 2-week course from December 4–15.

Tentative outline for the 1-week course.—Demonstrations, lectures and round-table discussions, supplemented by laboratory exercises.

1. The role of the laboratory in tuberculosis control	1 day.
2. Safety measures in tuberculosis laboratories	
3. Preparation of culture media	
4. Techniques of microscopy	1 day.
5. Interpretation of results and reporting	
6. Culture technique	1 day.
7. Digestion and concentration	
8. Diagnosis by cultural methods	1 day.
9. Animal inoculations and autopsies	
10. Assays of chemotherapeutic drugs	1 day.
11. Studies on evaluation methods	
12. Administration of a tuberculosis laboratory	

Tentative outline for the 3-week course.—Practical laboratory training, supplemented by lectures and demonstrations.

1. The role of the laboratory in tuberculosis control	2 days.
2. Safety measures in tuberculosis laboratories	
3. Preparation of culture media: Practice in making the commonly used diagnostic and research media	
4. Microscopic techniques: Training in preparation of smears and stains. Interpretation of findings. Fluorescent microscopy	
5. Lecture on biochemistry of tuberculosis	2 days.
6. Lecture on BCG	
7. Culture techniques: Training in preparation of cultures. Digestion and concentration methods. Particular emphasis on interpretation of findings. Includes training in identification of types of mycobocteria and their colony morphology	8 days.
8. Lecture on studies on evaluation methods	
9. Lecture on serology of tuberculosis	
10. Lecture on clinico-chemical tests in tuberculosis	
11. Animal inoculations: Training in techniques of inoculation and autopsy of mice, guinea pigs and rabbits. Tuberculin testing of animals	3 days.
12. Lecture on vole bacillus	
13. Lecture on use of chick embryos in the diagnosis of tuberculosis	
14. Lectures on the use of various animals in the diagnosis of tuberculosis	

Information and applications should be obtained well in advance from the Chief, Laboratory Services, Communicable Disease Center, Public Health Service, Chamblee, Ga.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MARCH 18, 1950

For the current week in the Nation, reported cases of influenza increased from 27,045 to 29,036. For the corresponding week last year, 3,780 cases were reported. The 5-year (1945–49) median is 4,054. The cumulative total for 11 weeks of the calendar year is 144,982 as compared with the corresponding total of 49,087 for 1949 and 169,936 for 1946, the highest year during the last 5 years.

Relatively large increases for the current week over the previous week were reported in Arkansas (788 to 1,465), District of Columbia (0 to 30), Indiana (1 to 71), Kansas (71 to 316), Kentucky (13 to 91), Maryland (19 to 61), New Mexico (1 to 58), New Jersey (8 to 24), and New York (19 to 49).

Increases for the current week over the preceding week occurred in 6 of the 9 geographic divisions, and ranged from 5 cases of influenza (3 to 8) in the New England to 2,019 (9,334 to 11,353) in the South Atlantic. The West South Central decreased from 13,989 to 13,656 cases, and the Mountain and Pacific decreased from 1,833 to 997 and from 60 to 54, respectively.

The 10 highest States and the number of cases reported are: Texas, 10,530; Virginia, 7,859; West Virginia, 2,654; Oklahoma, 1,654; Arkansas, 1,465; Tennessee, 864; Alabama, 816; South Carolina, 407; Georgia, 330; and Kansas, 316. The total cases reported by these 10 States is 26,895. Among the other States, 8 reported no cases and 2 reported 1 case each.

For the third successive week, total deaths reported in major cities were slightly above normal. The small increase in deaths is probably due in part to the increase in influenza and pneumonia. Reports of influenza and pneumonia deaths in these same cities are incomplete for the current week and the preceding week, but beginning with the week ended March 4, deaths from these two causes increased by 133 (352 to 485) over the preceding week.

Increases over the previous week are noted in reported cases of the following diseases which are also above the 5-year median: infectious encephalitis (9 to 17), meningococcal meningitis (103 to 111), and whooping cough (2,807 to 2,867). One case of anthrax and one case of psittacosis were reported in New York.

Telegraphic case reports from State health officers for the week ended March 18, 1950

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	------	------	1	44	------	15	------	------	12	------	------	------	32	------
New Hampshire	------	------	------	------	------	1	------	------	2	------	------	------	3	------
Vermont	------	------	------	26	------	------	------	------	1	------	------	------	17	------
Massachusetts	3	------	------	282	3	------	------	------	140	------	------	4	191	------
Rhode Island	------	------	4	5	------	------	------	------	11	------	------	------	41	------
Connecticut	------	------	3	25	2	68	1	------	29	------	------	------	120	------
MIDDLE ATLANTIC														
New York	5	7	[2] 49	979	9	401	8	------	[3] 156	------	------	3	187	16
New Jersey	1	1	24	966	5	126	------	------	56	------	------	1	144	------
Pennsylvania	5	------	------	389	3	99	------	------	131	------	------	4	225	1
EAST NORTH CENTRAL														
Ohio	5	------	13	160	2	46	1	------	261	------	------	1	201	8
Indiana	4	------	71	467	1	22	2	------	130	------	------	1	48	[4] 22
Illinois	------	------	4	219	4	102	------	------	66	------	------	1	93	3
Michigan	3	2	7	1,884	4	79	4	------	141	------	1	1	306	2
Wisconsin	1	------	284	492	1	24	------	------	92	------	------	1	113	------
WEST NORTH CENTRAL														
Minnesota	3	------	16	54	5	66	------	------	32	------	------	------	29	------
Iowa	------	------	233	565	2	6	------	------	14	------	------	------	18	3
Missouri	2	------	14	11	1	4	------	------	18	------	------	------	14	------
North Dakota	1	1	17	14	------	6	3	------	1	------	------	1	------	------
South Dakota	3	------	------	41	------	------	1	------	1	------	------	1	------	------
Nebraska	2	------	45	115	------	17	------	------	31	------	------	------	5	------
Kansas	1	------	316	37	1	21	------	------	25	------	------	------	25	------
SOUTH ATLANTIC														
Delaware	1	------	------	27	2	------	1	------	10	------	------	------	6	------
Maryland	4	------	61	43	1	57	------	------	34	------	------	------	44	------
District of Columbia	------	------	30	100	------	16	------	------	5	------	------	------	1	------
Virginia	7	------	7,859	83	7	245	------	------	25	------	1	2	41	2
West Virginia	6	------	2,654	387	2	48	1	------	12	------	------	------	39	7
North Carolina	7	------	------	274	2	------	------	------	34	------	------	1	85	------

South Carolina	3		407	73	1	18			3				16	9
Georgia	2		330	341	1	11			10		5		41	8
Florida	4	3	12	128	4	15	2		4				5	
EAST SOUTH CENTRAL														
Kentucky	8		91	59	10	53	7		28			2	58	23
Tennessee	12	1	864	133	2		1		22		1	3	45	11
Alabama	5		816	65	1	147	1	1	14				38	10
Mississippi	5		104	105	2	46			4		3	1	4	6
WEST SOUTH CENTRAL														
Arkansas	3		1,465	76	1	122	3		7			2	41	5
Louisiana	4		7	35	3	55	3		6		3	1	3	
Oklahoma	6	1	1,654	5	2	110			21				31	5
Texas	28		10,530	433	13	785	24		37			3	186	31
MOUNTAIN														
Montana			283	89	1				8		2		4	
Idaho			272	6		13	2		19				87	
Wyoming				13					7					
Colorado			138	73		32			7			2	23	7
New Mexico	2		58	38		24	1		6				19	
Arizona	1		233	134		20	1		12			2	56	
Utah			12	191		5			2		2		16	
Nevada			1	16		1								
PACIFIC														
Washington	1		5	65	2	4			63				28	
Oregon			36	25		23			22				49	
California	5	1	13	327	11	59	6		105			1	56	1
Total	163	17	29,036	10,119	111	3,021	73	1	1,880		18	39	2,867	183
Median, 1945–49	262	7	4,054	22,206	99		30		3,236	5	14	51	2,269	
Year to date, 11 weeks	1,786	133	144,982	74,201	997	27,562	[5] 1,137	11	19,580	13	254	510	28,134	1,656
Median, 1945–49	3,233	75	105,570	152,241	940		467	6	31,256	45	227	485	24,659	
	(27th)		(30th)	(35th)	(37th)		(11th)		(32d)	(35th)		(11th)	(39th)	
Seasonal low week ends	July 9		July 30	Sept. 3	Sept. 17		Mar. 19		Aug. 13	Sept. 3		Mar. 19	Oct. 1	
Since seasonal low week	6,057		175,512	93,331	1,910		[5] 42,619		36,019	20		3,883	49,670	
Median, 1944–45 to 1948–49	10,799		138,554	178,365	1,905		19,406		56,560	99		4,013	48,186	

[1] Including cases reported as salmonellosis.
[2] New York City only.
[3] Including cases reported as streptococcal sore throat.
[4] Reported for 2 weeks.
[5] Deduction: Georgia, weeks ended Jan. 21 and 28, 1 case each.

Anthrax: New York, 1 case.
Psittacosis: New York, 1 case.
Alaska: Influenza 49, whooping cough 5.
Hawaii: Diphtheria 1, poliomyelitis 1.

TERRITORIES AND POSSESSIONS

Puerto Rico

Notifiable diseases—4 weeks ended January 28, 1950.—During the 4 weeks ended January 28, 1950, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	49	Tetanus, infantile	3
Diphtheria	28	Tuberculosis (all forms)	289
Dysentery	1	Typhoid fever	10
Influenza	102	Typhus fever (murine)	1
Malaria	8	Venereal diseases:	
Measles	3	Gonorrhea	67
Poliomyelitis	5	Syphilis	9
Tetanus	12	Whooping cough	319

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended March 4, 1950.—During the week ended March 4, 1950, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox			24	2	265	326	37	18	45	130	847
Diphtheria					4					2	6
Dysentery:											
Amebic										1	1
Bacillary						4	1	4		1	10
German measles			61		3	650		27	251	491	1,483
Influenza			26			18	10			2	56
Measles	1		10	5	397	630	20	9	23	162	1,257
Meningitis, meningococcal						1	1				2
Mumps			122	1	132	683	13	37	105	508	1,601
Poliomyelitis					1					1	2
Scarlet fever	2		6		77	57	3	1	53	8	207
Tuberculosis (all forms)	34		4	11	102	16	11	4	6	22	210
Typhoid and paratyphoid fever					9					1	10
Undulant fever					4		2	1			7
Venereal diseases:											
Gonorrhea	4		8	12	91	41	17	18	23	43	257
Syphilis	13			9	65	25	5	8		11	136
Other forms										1	1
Whooping cough	1		14		59	54	1	1	1	12	143

EGYPT

Cerebrospinal meningitis.—Information has been received that 79 cases of cerebrospinal meningitis, with 7 deaths, were reported in Cairo during the period February 26–March 4, 1950. During the preceding week, 66 cases with 15 deaths were reported. The 7-year (1942–48) median for Egypt for the second 4-week period was 14 (in 1948), and for the third 4-week period 13 (in 1946). The maximum for each of these periods was 38 and 33, respectively (in 1942).

GERMANY

Q fever.—On February 8, 1950, information was received that German health agencies reported 90 cases of Q fever in Zusenhausen, a locality of about 1,500 population near Heidelberg.

JAPAN

Influenza.—According to information received March 1, 1950, 2,327 cases of influenza occurred in Japan during the period February 12–18, a decrease of 15 percent from the number of cases reported during the preceding week. Information received March 9 stated that 1,764 cases were reported during the week ended February 25.

MADAGASCAR

Notifiable diseases—January 1950.—Notifiable diseases were reported in Madagascar and Comoro Islands during January 1950 as follows:

Disease	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Beriberi			1	
Bilharziasis	1		49	3
Diphtheria	1		8	1
Dysentery:				
Amebic	10		562	7
Bacillary			25	10
Erysipelas			21	1
Influenza	20		1,559	82
Leprosy			44	
Malaria	356	4	46,879	292
Measles			260	3
Meningitis, meningococcal	1			
Mumps	2		174	
Plague			15	15
Pneumonia:				
Broncho			698	102
Pneumococcic	3		585	75
Puerperal infection			2	1
Relapsing fever	1			
Tuberculosis, pulmonary	2		166	20
Typhoid fever	3		24	7
Whooping cough	6		396	13

NORWAY

Notifiable diseases—December 1949.—During the month of December 1949, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Diphtheria	20	Paratyphoid fever	[1] 3
Dysentery, unspecified	3	Pneumonia (all forms)	3,565
Encephalitis, epidemic	6	Poliomyelitis	12
Erysipelas	399	Rheumatic fever	89
Gastroenteritis	2,475	Scabies	1,656
Hepatitis, epidemic	95	Scarlet fever	282
Impetigo contagiosa	2,123	Tuberculosis (all forms)	347
Influenza	3,858	Typhoid fever	2
Laryngitis	13,021	Venereal diseases:	
Malaria	6	Gonorrhea	179
Measles	1,171	Syphilis	62
Meningitis, meningococcal	7	Weil's disease	1
Mumps	182	Whooping cough	4,103

[1] Includes 2 cases salmonellosis.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India.—During the week ended March 11, 1950, 199 cases of cholera, with 62 deaths, were reported in Calcutta.

Indochina (French)—Cochinchina.—During the week ended March 4, 1950, 1 fatal case of cholera was reported in Rachgia, Cochinchina.

Pakistan.—During the week ended February 25, 1950, 2 fatal cases of cholera were reported in Dacca. During the week ended March 4, 4 cases of this disease, with 3 deaths, were reported in Chittagong.

Plague

Belgian Congo.—Plague has been reported in Belgian Congo as follows: On February 20, 1950, one fatal case in the village of Kwandruma, northeast of Blukwa, Stanleyville Province; on February 22, one fatal case in Butakonda, a village northeast of Lubero, Costermansville Province.

Burma.—During the week ended January 7, 1950, 8 cases of plague with 7 deaths were reported in Yenangyaung, and 2 cases with 1 death were reported in that port during the week ended January 14. During the week ended January 28, 1 fatal case was reported in the port of Bhamo.

China.—Plague has been reported in China as follows: November 1–30, 1949, 10 deaths in Wenchow, Chekiang Province: December 1–31, 1949, 28 deaths in Fukien Province; December 1–19, 1949, 16 cases, 13 deaths in Kiangsi Province; February 2–4, 1950, 4 deaths in Wenchow, Chekiang Province; February 1–7, 1950, 9 cases, 4 deaths, in Kuan-tien Village, Sui-chi District, Kwangtung Province. Information dated March 1, 1950, stated that 63 deaths from plague had been reported in Katou and Paktam, two small towns in the area of Onpo in Kwangsi Province.

Indochina.—Plague has been reported in Indochina as follows: Week ended February 18, 1950, 4 cases, 1 death—1 case, 1 death in the rural area of Pnompenh, Cambodia, 3 cases in Phanthiet, Annam; week ended February 25, 6 cases, 1 death—1 case, 1 death in Pakse, Laos, 5 cases in Phanthiet, Annam; week ended March 4, 3 cases in Phanthiet; week ended March 11, 4 cases in Phanthiet.

Siam (Thailand).—During the week ended February 18, 1950, 15 cases of plague with 3 deaths were reported in Siam, including 10 cases 1 death in Nakhon Rajsima Province. Four cases with 1 death were reported in Siam during the week ended February 25.

Union of South Africa—Orange Free State.—During the week ended January 21, 1950, 1 fatal suspected case of plague was reported in Bothaville District. Orange Free State.

Smallpox

Afghanistan.—During the month of January 1950, 61 cases of smallpox were reported in Afghanistan.

Burma.—During the period January 1–February 18, 1950, 2,720 cases of smallpox, with 939 deaths, were reported in Burma. For the week ended February 25, 245 cases, 92 deaths were reported, and 286 cases with 116 deaths were reported during the week ended March 4.

Cameroon (British).—During the week ended February 4, 1950, 203 cases of smallpox, with 66 deaths, were reported in British Cameroon.

China.—Smallpox has been reported in China as follows: December 1, 1949 to January 20, 1950, 107 cases in the Wuchang-Hankow area, Hupeh Province; February 11–20, 1950, 26 cases, 12 deaths, in Swatow; week ended March 11, 1950, 21 cases in Shanghai.

French West Africa.—For the period February 11–20, 1950, 158 cases of smallpox were reported in French West Africa, including 48 cases in Ivory Coast, 73 cases in Niger Territory, and 16 cases in French Sudan.

India.—For the week ended March 11, 1950, 497 cases of smallpox were reported in Calcutta, and 179 cases were reported in Madras.

Typhus Fever

Afghanistan.—During the period January 1–23, 1950, 67 cases of typhus fever were reported in Afghanistan.

Germany.—During the week ended February 4, 1950, 1 case of typhus fever was reported in the Province of Westphalia, and during the week ended February 11, 1 case (murine type) was reported in Hamburg. Both of these localities are in the British Zone. One case was reported during the week ended February 18, and 1 case during the week ended February 25, at Reinickendorf in the French Sector of Berlin.

Italy—Sicily.—During the month of November 1949, 17 cases of typhus fever were reported in Sicily.

Japan.—Thirty-four cases of typhus fever were reported in Tokyo, and 5 cases in Yokohama, during the week ended March 4, 1950.

Madagascar.—During the month of January 1950, 1 fatal case of typhus fever (murine type) was reported in Tamatave.

Yellow Fever

Gold Coast.—Yellow fever has been reported in the Oda Area of Gold Coast as follows: On January 1, 1950, 1 case, confirmed, at Atiankama; on February 16, 1 suspected case, on February 18, 1 suspected case, on February 21, 1 suspected case, all at Akwatia.

DEATHS DURING WEEK ENDED MARCH 18, 1950

	Week ended Mar. 18, 1950	Corresponding week, 1949
Data for 93 large cities of the United States:		
Total deaths	10, 547	9, 723
Median for 3 prior years	9, 975	
Total deaths, first 11 weeks of year	107, 538	107, 784
Deaths under 1 year of age	616	669
Median for 3 prior years	669	
Deaths under 1 year of age, first 11 weeks of year	6, 811	7, 292
Data from industrial insurance companies:		
Policies in force	69, 832, 790	70, 543, 550
Number of death claims	12, 834	13, 535
Death claims per 1,000 policies in force, annual rate	9. 6	10. 0
Death claims per 1,000 policies, first 11 weeks of year, annual rate	9. 8	9. 8

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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21 JUN 1950

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Eff[illegible]ation and Reaction (pH) on the [illegible]vity of Chloramine–T

[illegible] GEORG[illegible] WEBER*

The Public Health Service Milk Ordinance and Code (*1*) and the corresponding Public Health Service Ordinance and Code for Restaurants (*2*) recommend the use of hot water at 170° F. for a period of [illegible] satisfactory bactericidal treatment for milk or food ute[illegible] of hot water, hypochlorite (chlorine) compounds are perm[illegible] concentration of 50 parts per million with an exposure [illegible] minutes. Chloramines, of which the most important commerc[illegible] for food utensils is chloramine–T,[1] are permitted to be used in a similar manner to hypochlorites. An exact concentration in terms of parts per million is not stipulated, but the recommendation is made that it be bactericidally equivalent to 50 parts per million of available chlorine (av. cl.) as hypochlorite. The studies reported here were designed to determine the concentration of available chlorine as chloramine–T which is bactericidally equivalent to 50 ppm av. cl. as hypochlorite.

The procedure used for these studies was a modification of that reported by Weber and Black (*3*, *4*). The modifications included: (1) Alteration of time intervals to meet the needs for very short (a few seconds) and very long (several hours) survival curves; (2) higher dilutions for plating at each time interval, up to and including 10^{-6}; (3) preparation of a survival curve by graphing logarithm of the percent of survivors against time, and determining as the killing time that required to kill 99.9999 percent of the exposed organisms; (4) preparing 8 ml. rather than 9 ml. M/320 buffered phosphate dilution blanks and aseptically adding 1 ml. of a solution of the required concentration of sodium thiosulphate for chlorine neutralization just prior to use. This was made necessary, because, in working with extremely alkaline compounds, it was necessary to add appreciable amounts of HCl to the buffered blanks to neutralize immediately the alkali so that surviving bacteria would not be killed, and in autoclaving blanks containing sodium thiosulphate in the presence of this acid, the sodium thiosulphate was decomposed.

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*Scientist, Public Health Service, Environmental Health Center, Cincinnati

[1] Sodium paratoluene sulfonchloramide.

The test organism used was *Micrococcus pyogenes* var. *aureus*. Available chlorine concentrations for both hypochlorites and chloramines were determined by use of the sodium thiosulphate (starch-iodide) titration, standardized against N/100 potassium dichromate (*5*, *6*). In these experiments only initial chlorine concentrations were determined. All chlorine solutions were made in distilled water. Residual chlorine in 9 ml. dilution blanks was periodically checked with ortho-tolidine (*5*) for possible incomplete neutralization of the chlorine. Determinations of pH were made electrometrically by means of a glass electrode. All tests reported in this study were made at 25° C. Petri dishes were poured with tryptone glucose extract agar and incubation was at 35° C. for 48 hours. Other details are described elsewhere (*3*, *4*).

Preliminary studies were made with seven chloramine–T products in order to classify the compounds. One compound representing each "class" was selected for more detailed study. Generally, each killing time reported is the arithmetic mean of two or more, in a few cases, one, determinations made from a graph of the logarithm of percent of survivors against time. Some of the compounds studied were buffered more completely than others. Determinations of pH for duplicate experiments generally did not show much variation but slight variations were averaged (arithmetically) in order to establish points on the graphs (fig. 1 and 3).

Results

The results of this study are presented in the table and figures 1, 2, and 3. The table shows that, with hypochlorites at a concentration of 50 ppm, at pH 8.9 and below, the killing time was less than 5 seconds; at pH 10 (buffered, using carbonates), 0.40 minutes; and at pH 11.2, 1.85 minutes. The number of organisms employed was about 100 million or less per milliliter and would appear to be comparable to that to be expected on a heavily contaminated food utensil (*3*).

In the case of chloramine–T with 50 ppm av. cl. at pH 6.3, the killing time was 0.78 minutes; at pH 6.4, 2.15 minutes; at pH 7.4, 11.6 minutes; at pH 8.3, 31.5 minutes; and at pH 10.5, the killing time was prolonged to 372 minutes (6.2 hours). Each of these pH levels represents a different commercial product except that the one used at pH 6.3 is the same as that at pH 10.5 with the pH lowered by the addition of dilute HCl.

At a chloramine–T concentration of 250 ppm, a similar effect of pH was noted. At pH 6.9, the killing time was slightly less than 1 minute; at pH 8.3, 15.5 minutes; and at pH 11.3, 256 minutes. Again

Effect of pH and concentration on killing time of chloramine–T, compared with hypochlorite (25° C.; Micrococcus pyogenes *var.* aureus)

Chlorine compound	pH	Initial concentration av. cl. ppm.	Killing time 99.9999 percent
			Seconds
Hypochlorite	8. 5	50	<5
	8. 9	50	<5
			Minutes
	10. 0	50	0. 40
	11. 2	50	1. 85
Chloramine–T	6. 3	50	*0. 78
	6. 4	50	2. 15
	7. 4	50	11. 6
	8. 3	50	31. 5
	10. 5	50	372
	6. 9	250	0. 97
	8. 3	250	15. 5
	11. 3	250	258
	7. 2	500	1. 26
	8. 3	500	8. 5
	11. 5	500	141
	7. 5	1, 000	1. 6
	8. 2	1, 000	4. 4
	11. 7	1, 000	66
	8. 1	1, 500	2. 4
	8. 3	1, 500	2. 7
	11. 9	1, 500	52

* pH adjusted.

with 500 ppm available chlorine introduced as chloramine–T at pH 7.2, the killing time was 1.26 minutes; at pH 8.3. 8.5 minutes; and at

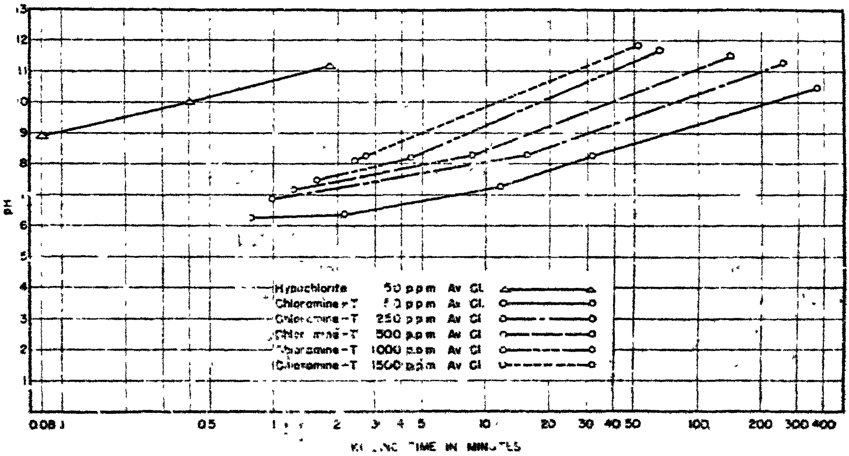

Figure 1. Effect of pH and concentration of chloramine–T on killing time (99.9999 percent) of *Micrococcus pyogenes* var. *aureus*:25° C.

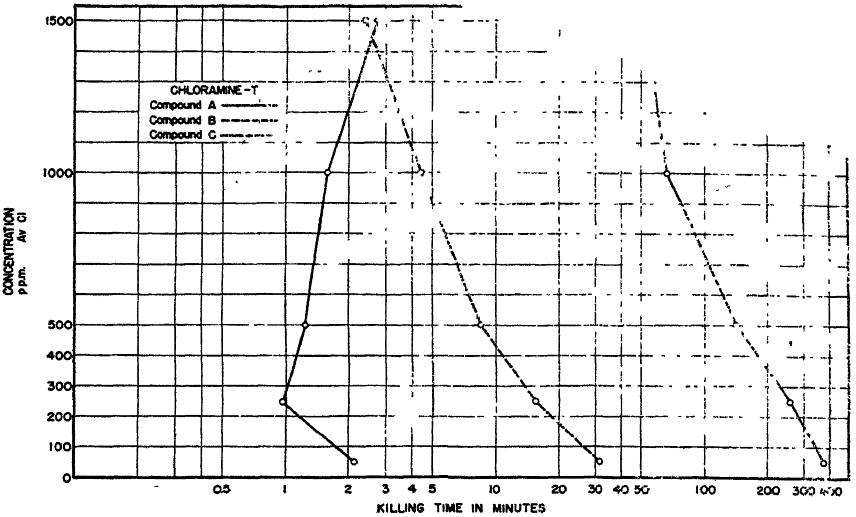

Figure 2. Effect of concentration of chloramine–T on killing time (99.9999 percent) of *Micrococcus pyogenes* var. *aureus*:25° C.

pH 11.5, 141 minutes. Similarly, when using 1,000 ppm av. cl. introduced as chloramine–T, the killing time ranged from 1.6 minutes at pH 7.5 to 66 minutes at pH 11.7. The results employing 1,500 ppm av. cl. as chloramine–T likewise show the pronounced effect of pH upon the killing time. Each of the three pH levels represents a different commercial product. It is of interest to note that the slight rise in pH from 8.1 to 8.3 appears to be reflected in a slightly increased killing time from 2.4 to 2.7 minutes. This trend is maintained as is evident at pH 11.9 with a killing time of 52 minutes.

The data from the table are presented graphically in figure 1 (semi-log) with pH on the arithmetic scale and killing time on the logarithmic scale. The logarithmic scale was employed here so that killing times from only a few seconds up to 372 minutes (6.2 hours) could be plotted on the same graph. The pronounced effect of pH on the killing time at each concentration of available chlorine introduced as chloramine–T is evident. Somewhat similar results may be observed with 50 ppm av. cl. as hypochlorite, but for a given pH the killing times are much shorter.

Figure 2 shows the effect of increased concentration of three commercial chloramine–T compounds on the killing time. With compound A, 50 ppm av. cl. resulted in a killing time of 2.15 minutes, and, with an increased concentration to 250 ppm av. cl., the killing time was shortened to only 0.97 minute. However, with the addition of more chloramine–T to 500, 1,000, and 1,500 ppm av. cl., the killing time was gradually increased to 1.26, 1.[illegible] and 2.7 minutes, respectively. Paradoxically, above 250 ppm av. cl., the higher the concentration, the

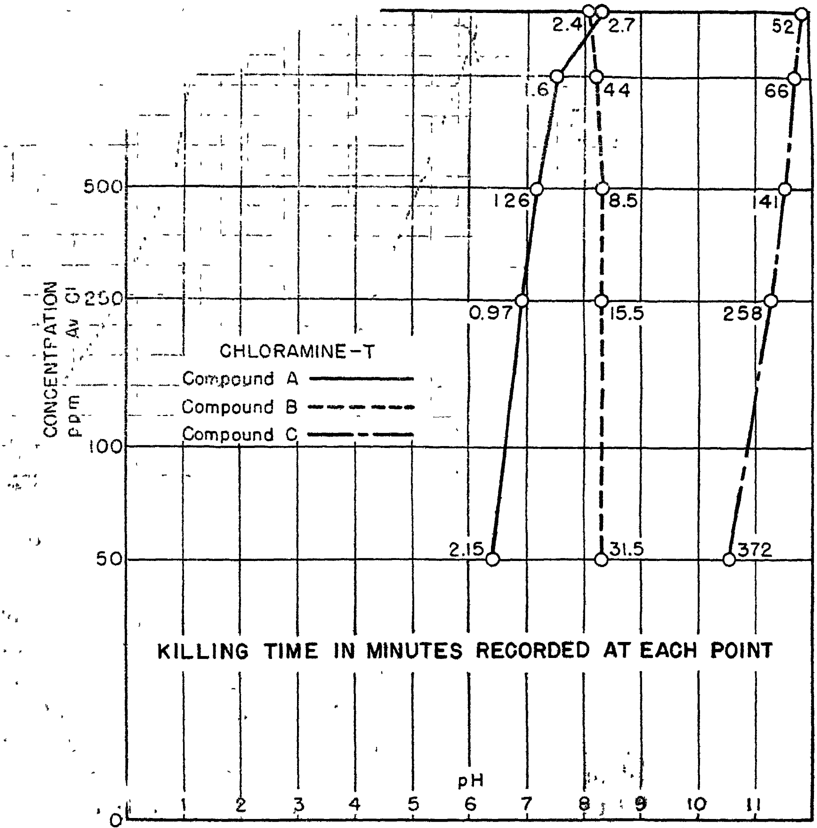

Figure 3. Effect of concentration of chloramine–T on pH:25° C. (*Micrococcus pyogenes* var. *aureus*).

longer the killing time, although even at the highest concentration used (1,500 ppm) the killing time was only slightly longer than at 50 ppm. Compound B showed a gradual reduction in killing time as the concentration was increased. At a concentration of 50 ppm av. cl., the killing time was 31.5 minutes, and at 1,500 ppm this was reduced to 2.4 minutes. Chloramine–T compound C also showed a reduction in killing time from 372 minutes with 50 ppm av. cl. to 52 minutes at a concentration of 1,500 ppm.

Figure 3 shows the effect of concentration on pH with each of the three chloramine–T compounds reported in figure 2. Killing times are reported in minutes on the graph. Compound A varies from pH [illegible] with 50 ppm av. cl. to pH 8.3 at 1,500 ppm. Compound B is rat[illegible] well buffered and ranges only from pH 8.3 at 50 ppm to pH [illegible] 1,500 ppm. With compound C, the reaction changes from pH 10.5 at 50 ppm to pH 11.85 at 1,500 ppm.

Discussion

The problem of just what concentration of available chlorine introduced as chloramine–T should be used in order to be bactericidally equivalent to 50 ppm av. cl. introduced as hypochlorite is made more difficult in that two factors exert influence on the killing time: pH and concentration of available chlorine. Generally one might expect that by increasing the concentration of available chlorine (chloramine–T) the desired result could be attained, namely, a shortened killing time within the limits of those found for hypochlorites. This is not necessarily the case, however, especially with poorly buffered chloramine–T products. If the chloramine–T is not adequately buffered, as more of the compound is added to increase the concentration of available chlorine, the solution becomes more alkaline. This shift in pH in some cases may actually offset any shortening in killing time resulting from an increased concentration of available chlorine. This is exactly what occurred with chloramine–T compound A (fig. 2). Both pH and concentration influenced the killing time. At 50 ppm, the reaction (pH 6.4) was favorable for a rapid kill (fig. 3). At a concentration of 250 ppm, the pH was 6.9 and the killing time was 0.97 minute, more favorable than at the lower concentration. However, as the concentration of available chlorine was increased above 250 ppm, the killing time was actually increased due to the apparently greater influence of pH than concentration of available chlorine. Chloramine–T compound B (fig. 2) showed a shortened killing time with increase in concentration, and the compound behaved somewhat differently from compound A. The explanation of this becomes apparent from figure 3 where it may be noted that compound B is highly buffered and shows no appreciable change in pH from a concentration of 50 ppm to 1,500 ppm av. cl. Compound A, however, is poorly buffered, and this gradual increase in alkalinity with increasing available chlorine concentration is sufficient to have a demonstrable effect on the killing time. Chloramine–T compound C behaved somewhat like compound B but is not so well buffered and is considerably more alkaline, thus accounting for the longer killing time at each concentration studied.

The pronounced effect of pH on the germicidal activity of hypochlorites and inorganic chloramines (ammonia-chlorine combinations) has been reported by a number of investigators (*7, 8, 9, 10, 11, 12*), but rather limited detailed studies are available on the organic chloramines such as chloramine–T (*13, 14*).

With hypochlorites, Johns (*7*) reported in 1934 that there was no [illegible] in germicidal activity between 25 and 10 ppm av. cl., but that 2 ppm was distinctly more active than 10 ppm. The explanation for this was believed to lie in the effect of pH on the proportion of the total "available chlorine" existing in the form of hypochlorous acid; hypochlorous acid was believed to be the germicidally active component. In 1935 Charlton and Levine (*13*) reported that: " 'available chlorine' was not found to be a direct measure of the germicidal efficiency of the calcium hypochlorite studied. A solution containing 1,000 ppm available chlorine was only slightly more germicidal than the same solution diluted with distilled water to 100 ppm (the reaction was changed by diluting from pH 11.3 to pH 10.4) and very much less efficient than 20 ppm of the same disinfectant at a reaction of pH 8.3." Rudolph and Levine (*8*) reported in 1941 that the more dilute solutions showed greater germicidal activity. They reported that the effect on the killing time induced by change in reaction exceeds the effect of dilution. Weber and Levine (*11*) in 1944 buffered hypochlorites at various reactions to demonstrate the effect of reaction (pH) for a constant chlorine concentration, and the effect of concentration at a constant reaction. The effect of pH on the germicidal activity of inorganic chloramines was demonstrated in 1944 by Weber and Levine (*11*) employing spores and by Butterfield et al. (*12, 15*) in 1946 using vegetative cells. Generally, as the alkalinity increases the germicidal activity is decreased, especially with vegetative cells. Some exceptions to this have been noted with spores (*11, 16*).

In 1935, Charlton and Levine (*13*) reported results of studies employing high concentrations of chloramine–T (1,000 to 4,000 ppm av. cl.) against spores. The pH range studied was limited to 6.0 to 8.8, and it was observed that increasing the acidity markedly reduced the killing time.

For the studies reported here, the "yardstick" by which chloramine–T compounds have been measured is the killing time required for 50 ppm av. cl. introduced as hypochlorite. The table and figure 1 show that, with this concentration of hypochlorite at pH 8.5 and also at pH 8.9, the killing time was less than 5 seconds. An exact time was not determined. (Similar results were noted at pH 7.6 and 7.9.) At pH 10 the killing time was 0.40 minute, and at pH 11.2, 1.85 minutes were required. From figure 1 it is evident that in terms of speed of reaction none of the chloramine–T products is as rapid as 50 ppm av. cl. (hypochlorite) at pH 10 (or below). However, if the killing time of 1.85 minutes at pH 11.2 is taken as a "yardstick" then chloramine–T products appear to be sufficiently rapid if the pH is sufficiently low and the concentration is adequate at the given pH. It is obvious then that, as with hypochlorites, two factors must be considered in determining the use of a chloramine–T as a bactericide, (1) pH and (2) concentration. Grossly then from figure 1 it appears that chloramine–T is appreciably less rapid in germicidal action than is hypochlorite.

Some studies of chlorine compounds reported in the literature have been designed to demonstrate factors in addition to bactericidal activity such as the effect of organic matter and detergency (*7, 16, 17, 18*). The experiments reported here have all been carried out in the absence of organic matter to demonstrate only bactericidal activity. It is generally recognized, however, that in the presence of organic matter, a reduction in germicidal activity will be effected. It has been demonstrated with hypochlorites that if the organic matter (at least certain types) is added slowly so that the available chlorine concentration remains considerably above that of the organic matter, the organic matter may be oxidized and the remaining hypochlorite which has not been reduced in the oxidation will remain an effective germicide (*19, 20*). Most investigations reveal that chemical germicides cannot be relied upon in the presence of more than few traces of organic matter. The surface of any food utensil should be thoroughly cleaned before applying a chemical bactericide.

Conclusions

It is evident from the results reported that the effect of reaction (pH) on the germicidal activity of chloramine–T is tremendous. Figure 1 shows that compounds with pH ranges higher than about 7.5 generally appear to be too slow to be of practicable usage in food utensil disinfection where only short periods of exposure are to prevail. Even increasing the concentration of these compounds up to as much as 30-fold (from 50 to 1,500 ppm) does not sufficiently shorten the killing time so that these chloramine–T compounds are quite equal in speed of reaction to even the more alkaline hypochlorites.

From figure 1 it appears that, if only about 250 ppm av. cl is to be maintained, the reaction must not be more alkaline than about pH 7.0. If chloramine–T compounds more alkaline than about pH 7.0 but less alkaline than pH 7.5 are to be used, then it would appear that concentrations of available chlorine should be increased up to 500 or even 1,000 ppm av. cl. These concentrations may be economically impracticable. If short exposure periods are required, then it would seem that only chloramine–T solutions not more alkaline than pH 7.0 or 7.5, in adequate concentrations, would be sufficiently rapid in germicidal action.

Whether or not this type of germicide could be sufficiently buffered so that it would not become more alkaline and less efficient in natural alkaline waters or whether it would have sufficient detergent action should be determined. Also there is the distinct possibility that chloramine–T solutions in the range of pH 7.5 to 7.0 or more acidic would be too corrosive (*21*) for metals to be of any practical value. If greater detergency action is needed, alkaline solutions would appear to offer some advantage; however, the exposure times required would be much greater. The possibility of combining synthetic neutral compatible detergents with neutral chloramine–T compounds could be considered but the possibility of metallic corrosion must not be overlooked.

If chloramine–T compounds are to be employed for bactericidal treatment of food and milk equipment, the pH, in addition to concentration of available chlorine, should be determined and from this information an adequate exposure period provided. Generally, this exposure period should be considerably greater than for hypochlorites under similar conditions. Although chloramine–T compounds would appear to have only limited usage where rapid germicidal action is required, they may be the germicide of choice under certain special conditions where long exposure periods are practicable.

Summary

A study has been made to determine the concentration of available chlorine introduced as chloramine–T which is bactericidally equivalent to 50 ppm av. cl. introduced as hypochlorite, as prescribed in the Milk Ordinance and Code and also the Ordinance and Code Regulating Eating and Drinking Establishments as recommended by the Public Health Service. The pH as well as the concentration of available chlorine should be determined in order to prescribe exposure periods for germicidal treatment of utensils with chloramine–T. Generally, considerably longer exposure periods are required for chloramine–T than are necessary for hypochlorite. Concentrations of chloramine–T of at least 250 ppm at a reaction not greater than about pH 7.0, or 500 to 1,000 ppm at reactions not more alkaline than pH 7.5, would appear to be as rapid in germicidal action (in the absence of organic matter) as 50 ppm of the slower (alkaline) hypochlorites. Commercial chloramine–T products generally are not adjusted to such a low pH, and there is some doubt as to the feasibility of using a chlorine germicide of such low pH.

ACKNOWLEDGMENT

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Successful Two-stage Resection of Carcinoma of the Upper Thoracic Esophagus with Reanastomosis

By H. L. Skinner, M. D., and Milton S. Lloyd, M. D.*

Cancer of the esophagus has long tested the resources of surgeons, and it has only been in the past decade that any significant success in the treatment of this disease has been noted. Important contributions in this field have been made by Adams and Phemister (*1*), Eggers (*6*), Churchill and Sweet (*4*), Garlock (*7*, *8*), Wookey (*16*), DeBakey and Ochsner (*5*). Satisfactory results with esophago-gastric procedures in lesions from the arch of the aorta and downward have been reported, and the stomach has been carried higher and higher until anastomosis has been performed in the neck.

Surgical excision of carcinoma of the upper thoracic esophagus and cervical esophagus presents a complex technical problem because of the difficulty in providing a suitable replacement for the resected esophagus when extensive excision is necessary. It is also noted that patients who have had a large portion of their stomachs brought up into the chest in esophago-gastric surgery are not entirely free of symptoms. In this type of surgery where the lower two-thirds of the esophagus is completely dissected, it has been observed that the color of the esophagus and its integrity seem to remain good for a long period of time. Also, because it is not necessary as a rule to tie off any vessels of consequence in dissecting the lower two-thirds of the esophagus, it was felt that if the esophagus was not transected at the time of operation, it would be possible to utilize the lower portion of the esophagus for reanastomosis in the cervical region for lesions above the arch of the aorta, and also in the cervical area.

In May 1949, a case of carcinoma of the esophagus just above the arch of the aorta was referred to one of the authors, Lloyd, who suggested that this should be a suitable operable case for this type of procedure. This report gives an account of surgical problems encountered in a successful two-stage resection of carcinoma of the upper third of the esophagus and subsequent end-to-end anastomosis in the cervical region.

Since thoracic surgery has come within the realms of elective surgery, two schools have developed. One of them, influenced by the high infection risk, attempted mobilization of the esophagus to convert the operation into an extrathoracic procedure, while the other attempted suture in situ by various methods. Many workers have concerned themselves with resection and suture of the esophagus. Successful intrathoracic suture of the resected esophagus has been reported as far back as 1901. Sauerbruch felt that the procedure of choice was the use of the Murphy button. Omi, in 1913, reported on nine experimental end-to-end sutures of the thoracic esophagus with seven cases successful. He used three layers of silk sutures, the first in the mucosa, the second in the muscle and adventitia, the third layer being an external continuous Lembert. Apparently, the failures were due to difficulty in avoiding a fatal degree of tension on the suture line. In 1923, Miller and Andrus (*10*), working on animals, demonstrated that the lower portion of the esophagus could be freed and that it was developed enough so that a successful anastomosis could be performed to the stomach as is the procedure today in surgery of the lower part of the esophagus. In recent years there have been reports in the literature on resection of short lesions in the esophagus with end-to-end esophageal reconstruction and replacement in the posterior mediastinum. Experimental work has also been done showing that end-to-end reconstruction of the esophagus is feasible if there is not too much tension on the suture line.

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Case Presentation

R. H., 49-year-old white male, was admitted to the hospital May 9, 1949. Chief complaint: dysphagia. His illness began in March 1949. A few days later while eating he suddenly was unable to swallow food and had to cough it up, but immediately afterwards he resumed eating without difficulty. He consulted a physician who referred him for X-ray examination (fig. 1). The results of this examination prompted the referral to one of the authors, Lloyd, for an esophagoscopy which revealed an early squamous cell carcinoma of the upper third of the esophagus. Physical examination was essentially normal, and there were no tumor masses palpable in either side of the neck. Laboratory examinations showed a hyperchronic secondary anemia.

On May 16, 1949, the first-stage resection of the esophagus was performed through a posterio-lateral incision by resecting the 6th rib and a portion of the 5th rib, opening the pleura, and completely dissecting free the espohagus from the opening in the diaphragm to just below the level of the clavicle. Meticulous care was used in freeing the esophagus, and it was necessary only to ligate two branches from the intercostal vessels just above the arch of the aorta. The esophageal opening in the diaphragm was then incised and the stomach freed. The left gastric artery was ligated well away from the anastomotic branches along the lesser curvature and cardiac end of the stomach. It was not necessary to ligate the left gastroepiploic artery Having mobilized the esophagus and the stomach, an incision was made in the neck along the anterior border of the left sternocleidomastoid muscle, retracting the large vessels laterally and the thyroid medially,

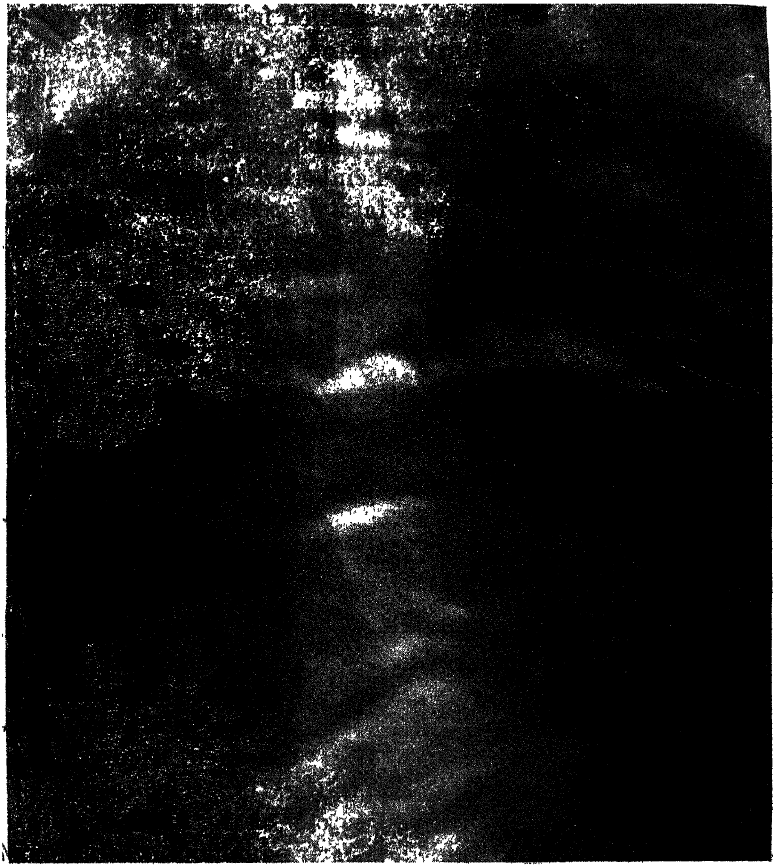

Figure 1. Original X-ray showing defect level of 2d rib anteriorly.

and ligating the inferior thyroid artery. The espohagus in the cervical area was then identified and dissected free until the upper portion of the esophagus could be brought out through the neck incision. The lesion was placed in the mid-portion of an esophageal loop which was left underneath the subcutaneous tissue. Silk sutures were placed in the muscle of the esophagus and sutured to the sternocleidomastoid muscle for identification at the secondary operation and also to localize the site of resection at that time. Before closure of the wounds, the elevated portion of the stomach in the chest cavity was plicated to form a tube-like structure. The diaphragm was then closed and the stomach attached to the diaphragm with interrupted sutures. Before the operation a Levine tube had been placed down through the esophagus into the stomach. This was left in place for feeding purposes (fig. 2). Both wounds were then closed. The lung was re-expanded and a catheter left in place in the pleural space for 48 hours using negative pressure suction. The postoperative course was quite

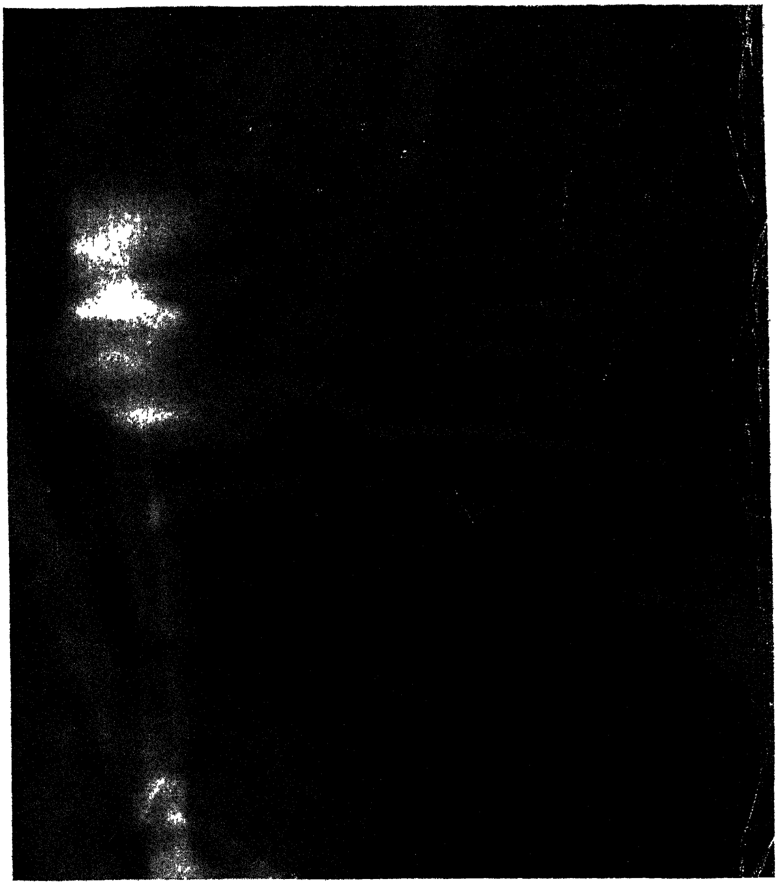

Figure 2. Showing exteriorization of esophagus in neck with Levin tube in place.

smooth. Between the first- and second-stage operations, swallowing through the esophageal loop took place in a normal manner. This supports the view that the mechanism of swallowing depends more upon the propulsive force generated in the mouth than upon peristalsis of the esophageal muscle.

On May 23, 1949, a second-stage resection was carried out by opening the skin incision in the neck and removing the esophageal tumor. This was done under local anesthesia. The anastomosis of the two [illegible] successful on the posterior surface, but the anterior surface proved difficult because of a thin and friable distal esophagus, and a [illegible] area of necrosis apparently caused by erosion of the Levine [illegible] The anastomosis was done with one layer of No. 000 intestinal cotton. The pathological report revealed a 9 cm. segment of esophagus after fixation and the microscopic section showed squamous cell cancer, grade II (fig. 3). The incision in the neck was closed

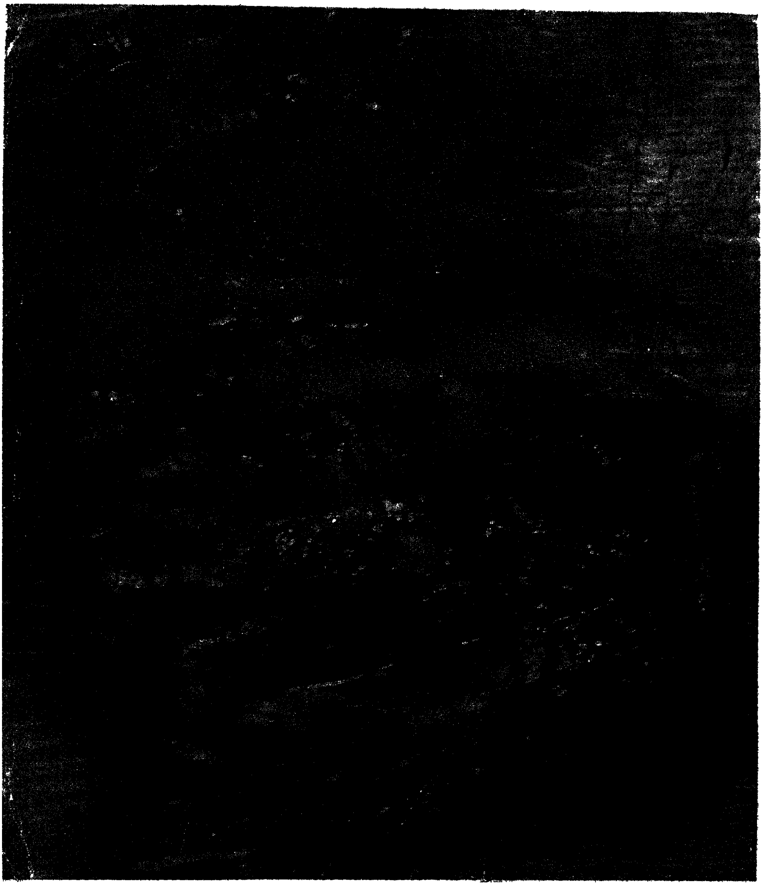

Figure 3. Photograph of actual lesion of esophagus removed.

with drainage, and a thin mucoid discharge came through the drainage tract for 5 days, and then ceased. The patient was fed by Levine tube for 8 days postoperative. On the 8th day, X-ray by barium swallow showed a fistulous tract and blind pocket under the skin. The tube was removed and the patient was given a fortified liquid diet which he was able to swallow without much difficulty. The diet was progressed to soft foods and after 2 weeks the patient again experienced difficulty in swallowing to the extent that clear liquids were troublesome. The wound had become tender and indurat
was necessary to drain a paraesophageal abscess. This draine
approximately a week after which the wound healed. X-ray a
time showed marked angulation of the esophagus (fig. 4). The p
was again readmitted July 25, 1949, and, under general anesthesia, the esophagus was freed above and below the elbow seen on X-ray, and from the scar formation present around the old fistulous tract

Figure 4. Angulation of esophagus after resection and anastomosis.

and the undersurface of the sternum. The esophagus was normal in appearance and had a rich blood supply. A reanastomosis was necessary to eliminate angulation and align the esophagus. This was done by using [illegible] 000 intestinal cotton in one layer. The esophagus was then placed in its normal position. Since the distal portion had a tendency to fall upward against the sternum, a portion of the sternocleidomastoid muscle was excised in its mid-portion, left attached [illegible] the sternum and rolled underneath the sternum, and sutured [illegible] the esophagus in its normal position. The wound was closed [illegible] drainage, but was healed by the 5th day. Barium swallow at this time showed the esophagus well aligned and without a fistulous tract. Follow-up of patient 3 months later reveals that his weight and blood count are normal, and he offers no complaint. He is able to eat any type of food and is working daily (fig. 5).

This case is interesting not only from the technical problem in

Figure 5. X-ray of esophagus 5 months postoperative.

volved in telescoping 4 inches of the esophagus through the mediastinum, but also in regard to blood supply of the esophagus. Apparently, the esophagus was able to revascularize itself from surrounding structures, as a rich blood supply to this distal portion was noted on the 3d operation approximately 2 months after the final procedure. This was not the case 1 week after the original procedure. This observation justifies nontransection of the esophagus at the primary operation, since a blood supply is provided from both directions until a new source of nourishment can be established. Erosion of the anterior wall of the esophagus from the feeding tube may be avoided by placing the lower end of the esophagus under the loop in the neck instead of over it. This would avoid pressure by the tube against the under-surface of the sternum.

It would appear that this operation may be indicated in those cases where the stomach cannot be brought up into the cervical region and may be applied to all lesions supra-aortic and in the cervical area.

It has the advantage of restoring the continuity of the esophagus, thereby preserving the propulsive force of the swallowing mechanism, plus the peristaltic force of the distal esophagus. The ulcerations of the esophagus which are sometimes seen in these cases postoperatively should be obviated.

It also provides for an anastomosis in the cervical area when the blood supply of the proximal and distal esophagus has been assured, and when the mediastinum is sealed off.

Another advantage is that it does not disturb the vagus nerves and set up the subsequent physiological disturbance which may occur after they are sectioned.

It has the disadvantage of displacing the abdominal viscera for a short distance in the chest, and it is a two-stage procedure. However, the latter should not be of too much importance if the desired result is obtained.

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Colorado Tick Fever

Isolation of Virus Strains by Inoculation of Suckling Mice

By J. W. OLIPHANT, M. D., and R. O. TIBBS*

The experimental transmission of the virus of Colorado tick fever to man and from man to the golden hamster by means of blood serum obtained from patients during the first or second febrile period of the disease was reported by Florio, Stewart, and Mugrage (*1*). The sera were stored in the cold until used. It was necessary to make repeated passages in the hamster before frank signs of illness or death appeared. Koprowski and Cox (*2*) isolated a strain of virus by intracerebral passage of human serum in DBA mice. The serum was obtained from a Colorado patient during the second febrile period and was chilled on ice during transit to New York.

Primary isolation of the virus by inoculation of albino Swiss mice has not previously been reported. Ten strains of the virus were isolated in this laboratory during 1948 and 1949 by intraperitoneal inoculation of Swiss mice 3 to 5 days old, using either blood serum or emulsified blood clot. The blood specimens were received from physicians in Colorado, Wyoming, Oregon, and Utah during April, May, June, and July. The stated interval between onset of illness and date the blood specimens were obtained varied from 1 to 10 days. The specimens were all forwarded to this laboratory by ordinary mail with a provisional diagnosis of Colorado tick fever. In some instances Rocky Mountain spotted fever or Q fever was also suspected.

The inoculum consisted either of undiluted emulsified blood clot or serum given intraperitoneally in a dose of 0.1 ml. to each of a litter (usually 4 to 7) of mice 3–5 days old. If signs of illness were not seen by the fifth day, some of the animals were sacrificed, the brains pooled, and a 20 percent emulsion made in 10 percent normal rabbit serum-saline. After centrifugation for 10 minutes at 1,000 rpm, 0.1 ml. of the supernate was injected intraperitoneally into each of a fresh litter of mice 3–5 days old. In five instances signs of illness were seen in the first generation of mice at intervals varying from 5 to 8 days after inoculation. In all series definite signs of illness appeared in animals of the first passage, consisting of excitability, hyper-irritability, and muscular incoordination. Terminal stupor and death usually occurred within 48 hours after appearance of illness. All virus strains were tested by neutralization test for identity, either against known [illegible] strain[1]) in baby mice or against [illegible] the new strains and tested for neutralization [illegible] mice about 21 days old. In all cases neutralization [illegible] LD[illegible] more of virus was demonstrated [illegible] the [illegible] of virus was infected mouse brains [illegible] oculation. The brains were emulsified [illegible] serum-saline to make a 20 percent suspension [illegible] at 1,000 rpm, serial tenfold dilutions of the supernatant [illegible] with 10 percent normal rabbit serum-saline. To aliquots of these dilutions were added equal quantities of immune serum or normal rabbit serum (controls). Groups of five normal mice were inoculated with each mixture. When the test was done in baby mice, the inoculum used was 0.1 ml. injected intraperitoneally. When 21-day old mice were used, the inoculum was 0.03 ml. given intracranially.

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Difficulty of Adaptation to Older Mice. Considerable difficulty was experienced in adapting virus strains to older mice. Attempts were made to adapt two of the strains to 21-day-old white Swiss mice by repeated blind passage of brain suspensions at 5-day intervals to fresh animals using both intraperitoneal and intracranial inoculations. After seven blind passages of each strain, no evidence of illness appeared in the 21-day-old mice, but 3-day-old mice were readily infected by intraperitoneal inoculation of pooled brain suspension from the seventh passage animals. A third strain was finally adapted to [illegible]-day-old mice by making passages of brain suspension to animals [illegible] gradually increasing age at each passage. Greatest difficulty was [illegible] in making the step from 16-day mice to older animals [illegible] necessary to make the 16–17- and 17–1[illegible]- day steps before the virus could be adapted to older mice.

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[1] Supplied by [illegible] Koprowski, Lederle Laboratories

INCIDENCE OF DISEASE

[illegible] State or lo[illegible] can effectively prevent or control disease without [illegible] and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MARCH 25, 1950

Reported cases of influenza in the United States for the week ended March 25 were 26,505 compared with the corresponding total of 28,915 cases reported for the preceding week and 3,611 for the 5-year (1945–49) median. These figures exclude Kentucky which reported an estimated total of 11,609 cases for the week, compared with only 91 cases reported for the preceding week.

The cumulative total of reported influenza cases for the first 12 weeks of this year is 170,959 compared with the corresponding total of 52,478 cases for 1949 and 170,339 for 1946, the second highest during the last 5 years.

Relatively large increases for the latest week over the previous week were reported in Idaho (272 to 401), Illinois (4 to 29), Iowa (233 to 353), Maine (1 to 1,058), Maryland (61 to 116), Missouri (14 to [illegible] Montana (283 to 625), New Jersey (24 to 49), New York (49 [illegible] Dakota (17 to 43), Washington (5 to 18), and Wyoming [illegible]

The following States reported relatively large numbers of cases: Texas (8,750), Virginia (6,109), West Virginia (2,275), Arkansas (2,241), Maine (1,058), Oklahoma (1,02[illegible] and Tennessee (722). Ten [illegible] [illegible] 5 cases or less. However, in some of these States [illegible] a legally [illegible]ortable disease.

A sp[illegible] U. S. Naval Training Center, Great Lakes, indicates that influenza has been prevalent there since [illegible]d-February. The weekly sick rate incr[illegible]ed irregularly from 5.9 [illegible] per 1,000 [illegible] week [illegible]ed January 7 [illegible] 39.2 for the week ended March 11. Most of this increase is attrib[illegible] clinic[illegible] mild and uncomplicated cases of influenza. Since March 1[illegible] however, the sick rate has declined.

Increases [illegible] previous week were repor[illegible] diseases: measles [illegible]9 to 11,940), pneumo[illegible] (3,0[illegible] scarlet fever (1,880 to 1,993), typhoid and paratypho[illegible] [illegible] 39 to 48) and whooping cough (2,867 to 2,9[illegible]1). One ca[illegible] small[illegible] was reported in Kentucky. Diphtheria cases decrea[illegible] fro[illegible] to 114 and poliomyelitis cases from 73 to 62.

Telegraphic case reports from State health officers for the week ended March 25, 1950

[Leaders indicate that no cases were reported]

Division and state	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine			1,058	42		6			11				32	
New Hampshire			2			6			5				9	
Vermont				37					9				29	
Massachusetts	4			335	1		1		177			2	211	
Rhode Island			5	2		4			11				28	
Connecticut			10	35	2	46			32			1	131	
MIDDLE ATLANTIC														
New York	5	4	[2]86	1,272	9	419			[3]165			6	[illegible]	[illegible]
New Jersey	3		49	[illegible]	1	96			70			1	129	
Pennsylvania	2			615	4	121	2		170			6	[illegible]	
EAST NORTH CENTRAL														
Ohio	10		3	352	5	125	2		247			1	241	[illegible]
Indiana	4		16	434		27	1		85		1	[illegible]	44	
Illinois	2		29	317	8	97	3		80		1		81	[illegible]
Michigan	8	6	14	2,474	2	85	3		208			[illegible]	[illegible]	[illegible]
Wisconsin			242	580	2	41			105				[illegible]	
WEST NORTH CENTRAL														
Minnesota	2		14	115	1	19	1		19				25	
Iowa	1		351	534	1	3			9				16	[illegible]
Missouri	[illegible]		[illegible]	50	2	127			22				24	
North Dakota			[illegible]	[illegible]		4			1					
South Dakota	1	1		[illegible]	[illegible]		2		15					
Nebraska			33	[illegible]	1	2			12				[illegible]	
Kansas	3		51	[illegible]	3	33	1		57				28	
SOUTH ATLANTIC														
Delaware				5					8				[illegible]	
Maryland	6		[illegible]	36	2	79			19			1	[illegible]	
District of Columbia	1		18	110		21			3					
Virginia	4		6,109	47	8	198	1		19				76	[illegible]
West Virginia	3	1	2,275	310	1	33	3		25			1	[illegible]	[illegible]
North Carolina	8		[illegible]	291	5				31			1		
South Carolina	4		369	54	1	36	[illegible]		1		1		35	
Georgia	1		371	189	2	19			8		4		4	[illegible]
Florida			21	110	1	17	3		4				22	
EAST SOUTH CENTRAL														
Kentucky				376	7	46			22	1			[illegible]	[illegible]
Tennessee	6		722	[illegible]	4				34			[illegible]	[illegible]	9
Alabama	8	1	675	50	5	85	2		10		[illegible]		[illegible]	5
Mississippi	1		186	296	2	67	1		6		[illegible]	2	4	[illegible]
WEST SOUTH CENTRAL														
Arkansas			[illegible]	42	7	76	1		2		1	2	[illegible]	2
Louisiana	5		16	81	3	31	3		6			4	3	[illegible]
Oklahoma	2		1,022	14		63	3		19		1	[illegible]	23	
Texas	11	[illegible]	8,750	425	11	929	15		24		1	[illegible]	[illegible]	[illegible]
MOUNTAIN														
Montana	2		625	132	2	2			7				[illegible]	
Idaho			401	36		13			2				4	
Wyoming			71	24									2	
Colorado			62	61	1	19	1		14				53	14
New Mexico			13	16		17			2				14	
Arizona	2		172	115		24			5				[illegible]	1
Utah	1		19	189		7	2		4		3		[illegible]	
Nevada						1							1	
PACIFIC														
Washington			18	105	2	6	1		69			1	41	
Oregon			19	26	2	32	1		16			1	37	
California	5	3	22	363	7	65	7		123			3	117	1
Total	114	17	26,505	11,940	116	3,147	62		1,993	1	19	48	2,901	178
Median, 1945-49	272	7	[4]3,611	21,613	106		31		3,103	4	20	45	2,198	
Year to date, 12 weeks	1,900	150	[4]170,959	86,141	1,113	30,709	1,199	11	21,573	11	273	[illegible]	31,035	183
Median, 1945-49	[illegible]	[illegible]	[4]117,[illegible]	175,422	1,040		494	6	34,189	[illegible]	251	522	26,857	
Seasonal low week ends	(27th) July 9		(30th) July 30	(35th) Sept. 3	(37th) Sept. 17		(11th) Mar. 18		(32d) Aug. 13	(35th) Sept. 3		(11th) Mar. 18	(39th) Oct. 1	
Since seasonal low week	6,171		[4]201,466	105,271	2,026		62		38,012	34		48	52,571	
Median, 1944-45 to 1948-49	11,076		[4]161,155	210,368	2,011		31		59,663	103		45	51,137	

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[1] Including cases reported as salmonellosis.

[2] New York City only.

[3] Including cases reported as streptococcal sore throat.

[4] Exclusive of Kentucky.

Alaska: Influenza 69, pneumonia 4, whooping cough 7.

Hawaii: Influenza [illegible], measles 1, meningococcal meningitis 1, scarlet fever 1, [illegible]

PLAGUE INFECTION IN LEA COUNTY, N.

Under date of March 24, 1950, plague infec[illegible] in a pool of 60 fleas, *Anomio[illegible]* [illegible] taken [illegible] nest found 6 miles north then 2 miles west of [illegible] New Mexico.

TERRITORIES AND [illegible]

Puerto Ri[illegible]

Notifiable diseases—4 weeks ended February 25, 1950.—During the 4 weeks ended February 25, 1950, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	79	Tetanus, infantile	[illegible]
Diphtheria	19	Tubercul[illegible] (all forms)	[illegible]
Dysentery	3	Typhoid fe[illegible]	[illegible]
Influenza	41	Typhus fever (mu[illegible]ne)	[illegible]
Malaria	6	Venereal diseases	
Measles	13	Gonorrhea	9[illegible]
Poliomyelitis	8	Syphilis	[illegible]
Tetanus	9	Whooping cough	[illegible]1

DEATHS DURING WEEK ENDED MAR. 25, 1950

	W[illegible] ended Mar. 25, 19[illegible]	Corresponding week, 1949
Data for 94 large cities of [illegible] n [illegible] tes.		
Total deaths	10,500	10,146
Median for 3 prior y[illegible]	[illegible],146	
Total deaths, first 12 [illegible]	[illegible]8,958	118,822
Deaths under 1 ye[illegible]	626	641
Median for 3 pr[illegible]	588	
Deaths under 1 [illegible] weeks of year	7,551	8,[illegible]
Data from industri[illegible] s.		
Policies in forc[illegible]	6[illegible],847,313	70,[illegible],114
Number of d[illegible]	13,960	12,[illegible]
Death claim[illegible] policies in fo[illegible], annual rate	10.4	9.5
Death clai[illegible] 0 policies, first 12 weeks of yea[illegible], annual rate	[illegible].8	9.8

FOREIGN REPORTS

CANADA

Week ended March 11, 1950.—Dur- [illegible] 1950, cases of certain notifiable diseases [illegible] Bureau of Statistics of Canada as [illegible]

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox			17		294	295	24	36	46	112	824
Diphtheria					11	1			6		18
[illegible]						3					3
[illegible]						2					2
German measles			109		13	372		37	180	223	934
Influenza			42			223	7	5			277
Measles			19	2	512	624	18	35	30	174	1,414
Meningitis, meningococcal						2					2
Mumps			96		275	632	3	60	135	363	1,564
Poliomyelitis					1						1
Scarlet fever	2		2	2	66	44	10	3	67	11	207
Tuberculosis (all forms)	19		7	6	107	27	20	13	5	27	231
Typhoid and paratyphoid fever					5	2					7
Undulant fever					2	1					3
Venereal diseases:											
Gonorrhea	4		7	4	97	39	27	17	29	65	289
Syphilis	6	1	2	9	75	29	5	10	7	20	164
Whooping cough	1		18		59	62	6	2		61	209

NEW ZEALAND

Notifiable diseases—4 weeks ended Janu [illegible] *50, and 4 weeks ended February 25, 1950.*—During the 4 [illegible] January 28, 1950, and the 4 weeks ended February [illegible], 1950, [illegible] notifiable diseases were reported in New Zealand as follows.

Disease	4 weeks ended Jan. 28, 1950		4 weeks ended Feb. 25, 1950	
	Cases	Deaths	Cases	Deaths
Diphtheria	4		[illegible]	
Dysentery:				
Amebic	3			
Bacillary	[illegible]			
Erysipelas				
[illegible]				

[illegible] weeks ended Jan. 28, 1950	4 weeks ended Feb. 25
	Deaths

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Indochina (French).—During the week ended March 11, 1950, five cases of cholera with three deaths were reported in Battambang, Cambodia.

Pakistan.—Four cases of cholera, with three deaths, were reported in Chittagong during the week ended March 11, 1950.

Plague

Brazil.—Reports of plague in Brazil have been received as follows: July 1–31, 1949, 2 cases 1 death in Bahia State; August 1–31, 1949, 10 cases 4 deaths in Bahia State, 2 cases in Pernambuco State; September 1–30, 1949, 12 cases 2 deaths in Bahia State, 3 cases in Minas Gerais State, 1 case in Pernambuco State.

Peru.—During the month of December 1949, 14 cases of plague were reported in Peru—11 cases in Ayabaca Province and 1 case in Huancabamba Province, Piura Department; 1 case in Chota Province, Cajamarca Department; 1 case in Trujillo Province, Libertad Department. During the month of January 1950, 2 cases were reported in Peru, both in Ayabaca Province, Piura Department.

Smallpox

Arabia.—During the week ended March 11, 1950, 10 cases of smallpox were reported in Mecca, and 7 cases in Jedda.

Burma.—Two hundred and eighty-two cases of smallpox, with 157 deaths, were reported in Burma during the week ended March 11 1950, including 90 cases 35 deaths in Rangoon and 72 cases 36 deaths in Bassein.

French Equatorial Africa.—For the period January 21–31, 1950, 74 cases of smallpox were reported in French Equatorial Africa.

Great Britain—Glasgow.—Information dated March 28, 1950, reported an outbreak of smallpox in Glasgow. As of that date four confirmed and four suspected cases had been reported in that city. The number of contacts was said to be large.

Indonesia—Java.—According to information dated March 21, 1950, an epidemic of smallpox has been reported in Surabaya, Java. Fifty-one cases were stated to have occurred on March 20, with the number increasing on March 21.

Mexico.—During the period February 12–25, 1950, 12 cases of smallpox were reported in Mexico City.

Palestine.—During the month of December 1949, 102 cases of smallpox were reported in Palestine, of which 28 occurred in Jerusalem, 33 in Hebron, and 27 in Jericho. During the month of January 1950, 63 cases were reported in that country, including 5 cases in Jerusalem, 26 cases in Hebron, and 31 cases in Jericho.

Typhus Fever

Egypt.—During the week ended February 25, 1950, 16 cases of typhus fever were reported in Egypt, including 4 cases in the port of Damietta.

Germany (United States Zone).—During the week ended January 21, 1950, one fatal case of typhus fever was reported in Bavaria, in the United States Zone of Germany. Two cases of this disease were reported in that area during the month of December 1949.

Libya.—During the month of February 1950, 19 cases of typhus fever were reported in Tripolitania.

Yellow Fever

Bolivia.—Information from Bolivia dated March 29, 1950, states that in the recent outbreak of yellow fever in that country 850 cases with 230 deaths were reported up to March 14. It is also stated that the outbreak was regarded as under control.

Sierra Leone.—One case of yellow fever has been reported in Sierra Leone. This case was stated to have had onset on January 27, 1950, and to have been confirmed on March 6.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

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[illegible] information regarding the incidence and geographic [illegible]ses in the United States, insofar as data are [illegible]allpox, typhus fever, yellow fever, and other [illegible]oughout the world; (2) articles relating to [illegible] of disease; (3) other pertinent information [illegible]ion of the public health.

[illegible]shed primarily for distribution, in accord- [illegible] of boards or departments of health, [illegible] in public health work. Articles [illegible]ts, in which forms they [illegible]ution.

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Experimental Transmission of *Salmonella oranienburg* Through Cockroaches

By Theodore A. Olson and Myrtle E. Rueger*

Long suspected as disseminators of human pathogens, the cockroach commensals of man have never been incriminated decisively and unequivocally as carriers of common disease agents. This is particularly true when one considers the potential role of these insects as carriers of the enteric organisms commonly referred to as food poisoning and food infection agents.

In view of the apparent need for additional and more concrete knowledge concerning the role of the cockroach as a carrier of enteric pathogens and enterotoxin producers, the investigation here described was begun in 1941.

Prior to 1947 studies related to the role of the cockroach as a disease carrier were conducted only as a side activity and were confined principally to methods for rearing and to the development of specific techniques for handling experimental insects. As a result of the rearing experiments which comprised the first work, a well-balanced food, moistened with honey and glycerine to promote its keeping qualities, was compounded. However, certain experiences with this food indicated that the honey and glycerine may have some effect on the flora of the roach intestine, and these agents were subsequently omitted. It was discovered rather early that the readily procurable dry commercial dog and fox foods could be substituted for the formula which had been worked out. Commercial products have therefore been used exclusively since that time as a matter of simplicity and convenience. A rearing cage which provided adequate ventilation and prevented fatal mold growths was also developed as a part of the basic program to provide an adequate supply of laboratory-reared insects for experimental use.

In 1943, as a part of the preliminary work involved in developing suitable methods for carrying out transmission experiments, a strain of *Salmonella enteritidis* was fed to a German roach and later recovered from its feces. The exact length of time between the infective feeding and the production of the infected pellet could not be determined under the conditions of the experiment, but was probably less than 2 days. Similarly, it was demonstrated that German roaches could carry living organisms in their intestines, for *Salmonella typhimurium* was recovered from the digestive tract of three experimental roaches 9 days after the original infective feeding. Unfortunately, the food in the cage was also infected at the end of this time, and it was therefore impossible to determine the exact survival time of the *Salmonella* within the alimentary tract of the insect.

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Additional experiments in 1944 in which the American cockroach was used indicated that it is very difficult to sterilize the exterior of the cockroach, even when surface tension reducers and sodium hydroxide are used as adjuncts to the sterilizing agent. For example, a 10-minute exposure with agitation to a 5 percent solution of formalin containing 1 percent Triton 770 and 1 percent sodium hydroxide would not completely wash off or kill organisms which were being carried by the insects. These findings made special precautions necessary in carrying out transmission experiments, especially where it was essential to demonstrate that organisms were actually being carried within the roach rather than on its exterior.

Experimental Methods

The colonies of roaches which have been maintained for experimental purposes include four species which are common in American homes: the American cockroach, *Periplaneta americana* L., the Oriental roach, *Blatta orientalis* L., the tropical or brown-banded roach, *Supella supellectilium* Serv., and *Blatella germanica* L., generally known as the German roach, although it is often called the "croton bug" or the "water bug."

Insects used throughout the experimental work were laboratory-bred specimens. The American and brown-banded cockroaches came from stock obtained in San Antonio, Tex., in 1944, while the colonies of Oriental and German roaches are descendents of specimens originally captured at the University of Minnesota in 1946. These colonies have always been free of *Salmonella*, but as a precautionary measure specimens have been checked carefully just prior to inclusion in an experimental group to insure their freedom from natural infection. They do, however, harbor other organisms than *Salmonella*, such as *Paracolobactrum*, *Proteus* and *Pseudomonas* species. Among these, the species *Pseudomonas aeruginosa* has occurred most abundantly and has sometimes been a source of annoyance because of its tendency to overgrow less hardy forms.

Cockroaches are reared in tightly glued rectangular 24- by 32-inch wooden boxes 9 inches high. Except for a 5-inch feeding platform running along one side, there is a false floor consisting of 14-mesh bronze wire screen set approximately 2 inches above the bottom of the box and flush with the feeding and watering area. The screen allows a considerable part of the excreta and other debris to fall through, thus removing it from the cage proper. Probably more important, it encourages air circulation through the area occupied by the insects. The top of the box is provided with a fine brass screen having 60 meshes to the inch and covering one-half of the area. In the remaining half there is a glass window for the purpose of observing the insects, and a trap door giving access to the interior of the cage. The screened top insures good air circulation and prevents mold growths which develop quickly if humidity is allowed to reach high levels. Such growths appear to be harmful to the roaches.

Water is supplied by a water-filled beaker inverted on sheets of filter paper placed in one-half of a petri dish. The paper which projects past the margin of the beaker provides a constantly moist surface from which the insects may drink, while the pouring lip of the beaker admits the small amount of air necessary to keep the fountain in operation. Water is replenished as needed—usually every 2 or 3 days.

The sole food of the roaches is fox chow which is served in self-feeders made from discarded tin cans. A can from which the top and bottom have been cut is slotted along one rim and placed in a petri dish. When the feeder is assembled, the slots, which are rectangular and large enough to allow a roach to pass through, serve as doorways along the bottom rim giving access to the food which has been placed inside. Since the can is open at the top, the feeder can be replenished readily at any time. Like the watering fountains, they can be removed and easily dismantled for cleaning.

Roaches used in transmission experiments must be kept under near-normal conditions, yet isolated to prevent contamination. After a series of experiments, two acceptable methods have been developed. In each, the wings and legs of the cockroach are immobilized to prevent contamination of feces and food. Water and normal food are supplied at all times in ample quantities, and fecal pellets are collected on a moist agar surface which prevents drying.

One of the methods, adapted from Macfie (*1*), has been used very successfully with the American roach. The insect is imprisoned within a groove in a large cork by a technique which confines legs and wings but leaves the head and posterior abdomen free. The other method involves fixing the insect by its wings and legs at the end of a wooden applicator stick, and is more applicable to the smaller German roach, although it has also been used with Oriental cockroaches.

Using an American roach as an example, the procedure employed in the first method is as follows:

A normal uninjured insect is removed from the rearing cage and anesthetized by exposing it to carbon dioxide gas for 1 to 2 minutes; other methods for immobilizing the insect, such as light chloroform anesthesia or a 5- to 10-minute chilling period in a refrigerator, have been employed, but are not as convenient or as free of after effects as the carbon dioxide method. When the insect becomes quiet and can be handled readily, it is quickly inserted in the groove of the cork. The wings are spread out on top of the cork on each side of the groove and at right angles to the body, where they are taped in place much as one would fix the wings of a butterfly on a stretching board. The legs which are left hanging free in the groove are next confined to that space by wrapping adhesive tape around the entire cork. To support the abdomen and prevent the roach from raising its hind legs over the edge of the cork, it is usually necessary to place a small piece of tape across the top of the groove. Trussed in this manner, there is complete freedom for the head and the abdomen of the insect, and the legs can be moved in a restricted space. If the cork has been properly selected for size, the head will project at one edge and the abdomen at the other, and there is no opportunity for the roach to contaminate other parts of the body while it is receiving its infective feeding, or to pass on infection from the mouth parts to the feces other than through its digestive tract. For the wingless female of the Oriental cockroach, a narrow strip of adhesive is taped across the thorax and fastened to the cork on either side. After the roach has been mounted on the cork, it is placed on a triangle of wire screen which rests on a petri dish containing agar media. By means of a carpet tack, the cork is centered along the hypotenuse of the triangle in such a manner that fecal pellets produced by the insect will fall directly on the agar surface. Food and water containers are also placed on the triangle support in positions slightly ahead of and flanking the roach. Water is provided by a medicine dropper plugged at its tip with a small cotton wick. This device is inserted in a cork and placed within easy reach of the insect. Food consisting of ground fox chow is supplied in a small cup dispenser made by soldering a short length of copper tubing, closed at one end, to a wire nail handle (six penny finishing nail). When the nail is pushed into a cork, the cup, like the water tube, can easily be adjusted to a position which enables the experimental insect to take food as desired.

This method of holding, feeding, and watering was advantageous for a number of reasons: it prevented mold growth in the food by keeping it dry; roaches could take food and water as needed; it was not as time-consuming as hand feeding by pipette or syringe; the insect was not continually disturbed by handling; and it was held immobile in a position which seemed more conducive to consumption of normal quantities of food and water. The large number of well-formed and normal fecal pellets produced by cockroaches held in this manner during experimental periods is additional evidence that this method is satisfactory.

In the case of the small German roach, it has been necessary to modify the method. A wooden applicator stick is inserted under the wings of the insect, and a narrow strip of adhesive tape is applied to keep them in place. Through the application of melted paraffin the legs are also fixed to the stick, which is then inserted in the hole of a cork fastened to a triangular support as in the method described for the larger roaches.

In the final experiments food and water were sterilized before feeding, and except on weekends, the dispensers were changed daily. In order that the experimental feedings might be completely accepted and regurgitation of an infective feeding avoided, it was necessary to establish the approximate optimum size of a cockroach meal. Such information is also useful in estimating the number of pathogens an insect can acquire during one feeding under natural conditions. Experimental observations of the fluid intake of an average-sized adult American roach indicated that 0.1 ml. was readily accepted, although on occasion more than twice this amount could be taken without regurgitation. A sterile 1 ml. tuberculin syringe with a 26- or 27-gage needle was used in giving an infective feeding to the American and Oriental roaches. They usually swallowed the measured amount of broth culture eagerly and without vomiting. Since the German roaches did not take the broth readily by this method, a modification was used with this species. Broth was either mixed with ground, sterile fox chow in a sterile feeding cup and offered to the roaches as solid food, or given overnight in place of drinking water.

A strain of *Salmonella oranienburg* recently isolated from a food-poisoning episode was selected as the test organism, for this species is very commonly involved in outbreaks of food infection in the United States and Canada. The outbreak from which the culture had been recovered was a typical example of "food poisoning" and involved 16 persons who had consumed chow mein with mushrooms. They were severely ill with headache, nausea, vomiting, diarrhea, abdominal cramps, and fever up to 103°. Many were confined to bed for several days. Upon laboratory examination, *S. oranienburg* organisms were isolated from the feces of 5 of the victims. The patient from whom the test strain was derived noted his first symptoms 16 hours after ingestion of the meal in question. This strain, isolated in September 1946, has undergone only three transfers since that time.

All experiments were carried out in a temperature-controlled bacteriological isolation room which was provided with an exhaust fan and with spun glass filters at both the air intake and outlet. A 30-watt ultraviolet germicidal lamp was installed in order that any air-borne contamination originating within the room might be reduced. Fecal pellets passed by the experimental roaches were collected on a moist agar surface, as recommended by Wedberg and Clark (*2*). A petri dish containing about 15 ml. of agar was placed beneath each cockroach to catch the feces. Various types of agar were used in the petri dishes and included desoxycholate, desoxycholate citrate, *Salmonella shigella* and desoxycholate citrate lactose sucrose agars. These media were used because they tended to inhibit molds which often became troublesome during the humid summer months. With the exception of desoxycholate citrate lactose sucrose agar, which was obtained from the Baltimore Biological Laboratories, the media used in all experiments were Difco[1] products. All cultures referred to in this paper were incubated for a period of 18–24 hours (sometimes 48 hours over weekends) at 37° C.

Pellets produced by the roaches were removed from the agar surface with a sterile loop and emulsified in 5 ml. of tetrathionate broth. Under the conditions of our experiment and with the roaches which were being used, tetrathionate broth appeared to be superior to other enrichment media. After incubation of the tetrathionate, plates of *Salmonella shigella* and desoxycholate agar were streaked successively without reloading the loop. Sometimes desoxycholate citrate or desoxycholate citrate lactose sucrose agar were substituted for the *Salmonella shigella* agar. Colorless colonies were transplanted to Kligler's iron agar slants. If the growth in this medium showed acid and gas in the butt of the tube, no change on the slant, and hydrogen sulphide production, the organism was typed with 04 *Salmonella* typing serum, using the plate technique.

In each group of test roaches the final positive result was checked by inoculation into portions of purple broth base containing lactose, maltose, dextrose, sacchrose, xylose, raffinose, arabinose, mannitol, dulcitol, sorbitol, inositol, dextrin, rhamnose, glycerol, and inulin. Simultaneously, inoculations were made into litmus milk, Simmon's citrate agar, gelatin, d-tartrate agar, nitrate agar, peptone water and MR–VP medium. If reactions were typical the cultures were typed completely for O and H antigens, using the technique outlined by Edwards and Bruner (*3*).

Experimental Results

When given a single dose consisting of 0.1 to 0.2 ml. of a *S. oranienburg* broth culture containing approximately 1,000 million organisms, the American roach has produced infected feces up to and including 10 days. Based on the passage of infected feces, one roach was infected for 10 days, two specimens for 9–10 days, three for 7 days, two for 4–5 days, and two tested for the first time on the 3d day were not infected. Usually roaches produced infected feces within the first 24 hours. A daily average of 4.3 fecal pellets per roach was passed by the infected insects during the period of observation, and 8 was the highest number of infected pellets obtained from a single roach in one day. Fecal pellets were usually 100 percent positive only during the first few days following an infective feeding. In one instance, however, all of 5 pellets passed by a roach on the 7th day were infected.

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[1] Use of trade names does not represent an endorsement of the products by the Public Health Service.

When the same organism was fed to German roaches, infection in one instance persisted for at least 12 days; one insect passed infected feces until the 12–15th day, one until the 9–11th day, one for 6 days, one for 3–4 days, and two apparently produced no infected feces, although one of these infected its water tube on the 2d day.

In feeding experiments where the Oriental cockroach was used, viable organisms of *S. oranienburg* were isolated from feces produced 20 days after an infective feeding. This species, like the others, usually passed infected pellets within 24 hours after the infective feeding. Thereafter, positive pellets were sometimes produced somewhat irregularly. The organisms were recovered from one roach on the 20th day and from one roach on each of the following days: 11–12th, the 9th, the 8th, and the 6th. Another roach found dead on the 3d day produced no feces, but it did infect its water tube during the 2d to 3d day. The roach which had passed positive feces on the 20th day was still infected when sacrificed at the end of 42 days. It would appear, therefore, that an insect can remain infected even after the period when positive feces are passed regularly.

Experiments with the brown-banded roach, *Supella supellectilium*, are scheduled. Earlier plans to test this species were changed when an epizootic of unknown etiology destroyed the stock colony of insects.

In addition to the observations made on the ability of roaches to transmit or carry infection, there have been supplementary experiments to obtain information on other points which may be of importance in considering the roach as a disease vector. For example, before the results of transmission experiments are evaluated, it is of interest to know the time required for passage of relatively inert materials and substances other than bacteria through the digestive tract of an insect. Carmine and acriflavine, a fluorescent material, were used for this purpose in tests with the American roach. Following a single feeding, carmine was retained for at least 6 days, as indicated by the color of the feces. Fluorescent feces were recovered for the same period after feeding acriflavine.

The survival time of *Salmonella* organisms in fecal pellets passed by experimental roaches is also of interest. Tests made with

American cockroach fecal pellets held at room temperature and above saturated salt solutions to produce known humidities show that *S. oranienburg* will survive in such excrement for 199 days at a relative humidity of 31 percent or slightly less, and for 85 days at 52–56 percent. In the control where humidity was not held constant, the survival was also 85 days.

Since the cockroach frequently wanders over dishes, kitchen utensils, and through dried foods in a cupboard, it is conceivable that the surfaces represented may become contaminated with the vomitus or feces of the insect. An experiment was therefore initiated to test the survival of *Salmonella* organisms on dishes and dried foods. Glass slides were used to simulate the surface of dishes, while soda crackers and corn flakes were used as representatives of the dried foods and cereals which are commonly exposed to this type of contamination. A broth culture of the organism was applied to the test material in small drops which soon dried. During the experiment pieces of glass or of food were removed from their sterile containers at short intervals and cultured in accordance with the usual method. All experiments were carried on at room temperature in order that conditions might closely resemble the actual field situation. Results obtained show that survival of our test strain of *S. oranienburg* on glass surfaces is 34 days, on crackers at least 88 days, and on corn flakes at least 62 days.

In addition to contamination by feces and definite vomitus, there is a possibility that roaches may infect food by mere mouth contact when feeding, or by direct body contact. These methods for the spread of pathogens become particularly important if the infective organisms survive long on mouth parts or body surfaces. The following observations have been made relative to this problem. In one instance where American roaches were being tested, food was definitely contaminated for a day after an infective feeding. Otherwise results have usually been negative when the standard dry food is used. Drinking water and liquids are in another category however. The wick of the water tube was frequently contaminated, especially on the 1st and 2d days after an infective feeding. On two occasions contaminated wicks have been found on the 3d day, and once during a 4–8-day period. It is apparent, therefore, that the roach can contaminate liquids by mouth contact or regurgitation for at least 4 days. Another experiment has demonstrated that a wick once contaminated may remain positive for at least 15 days.

To test the length of survival of *S. oranienburg* on the exterior of a roach, a small colony of this organism was spread on the pronotum of each of 12 American roaches. The insects were then placed in small individual glass cages and the pronotal areas were swabbed at intervals with moist, sterile, cotton-tipped applicator sticks which were placed in tetrathionate broth and subjected to the usual cultural procedure. By this method it has been determined that the organism can remain viable on the relatively smooth pronotal surface of a roach as long as 78 days.

Discussion

The roach, because of its dorsoventrally flattened morphology, small size, and general habits, is particularly suited to the spread of pathogens in areas not readily accessible to rats and mice. It can easily squeeze into rodent-proof rooms, relatively tight food bins and cupboards, or almost any food storage compartment. For example, large numbers have been observed in a tightly-closed ice box which was temporarily out of ice; in this instance entry was probably gained as a result of a loose door gasket or a faulty drain. In its eagerness for food the roach will consume almost anything it can chew, and frequently its voracious appetite leads to an overindulgence which can only be relieved by prompt regurgitation. It is this habit, associated with its proneness to deposit its excreta almost anywhere, which makes the cockroach a favored suspect as a food contaminator. Under optimum conditions a large number of fecal pellets are produced (frequently as many as 12 in a 24-hour period), and these are scattered at random during the various excursions of the insect. On casual inspection the pellets of the American roach are large enough to be readily mistaken for mouse droppings. It is therefore possible that some of the reports of soiled food products which have formerly been ascribed to rodents are actually referable to roaches.

It is apparent from the experimental evidence reported here that the roach, which is so admirably adapted to penetrate into various nooks and crannies of food preparation establishments, is also able to carry viable pathogens for long periods of time, and that by regurgitation or mouth contact, as well as through body contact and feces, it can contaminate foods directly or through kitchen utensils and dishes. Another factor of importance is the long survival of pathogens observed in cockroach feces under experimental conditions closely resembling those found in normal kitchens. The experiments show that *S. oranienburg* organisms remain viable for 85 to 199 days in fecal pellets. Such evidence greatly extends the sphere of influence of an infected roach, for it is evident that, even after its death, contamination of human food can occur through contact with feces, and cockroaches may actually be involved in food poisoning outbreaks where as a result of an effective extermination campaign there would ordinarily be no reason to suspect these insects as vectors.

Although it has been demonstrated that laboratory-reared cockroaches may harbor food poisoning and food infection organisms for some time, and that certain enteric organisms can survive for extended periods in their feces, on their bodies, and on glass surfaces or dry foods which are accessible to the roach, the evidence against the insect is not yet complete. Until the actual incidence of infection in wild cockroaches is determined on the basis of a large number of specimens and for a number of geographical areas, and until this information is integrated with definite epidemiological evidence, the roach can still be regarded only with grave suspicion.

Summary

In an effort to extend the available knowledge concerning insect-borne diseases and more specifically to attempt an evaluation of the role of cockroaches as carriers of food poisoning or food infection organisms, a series of transmission experiments was undertaken with *S. oranienburg* as the pathogen and three common species of household roaches as potential carriers.

Survival of the pathogen in the insects was determined by an examination of the feces. It was found that under the conditions of these experiments the test strain of *Salmonella* could survive for 10 days in the American roach, for 12 days in the German roach, and for 20 days in the Oriental cockroach. A post mortem examination of the Oriental roach showed that it was positive 42 days after an infective feeding, even though it had passed contaminated feces only during the first 20 days.

Supplementary experiments with the American roach have resulted in the accumulation of other information which is pertinent to the problem. Carmine and acriflavine were eliminated from the digestive tract of roaches approximately 6 days after feeding, indicating roughly the time required for mechanical clearing of the digestive system. Fecal pellets from an experimental roach have remained infective for a period of 199 days at room temperature, while organisms from a culture have survived on glass surfaces for 34 days, on ordinary soda crackers for 88 days, and on corn flakes for 62 days. On the relatively smooth pronotum of the roach, the organisms have been viable for 78 days. Through mouth contact, watering tubes of the roach have been contaminated at least 4 days after the infective feeding, and organisms have survived on the cotton wick of the watering device for 15 days.

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Q Fever Studies in Southern California

IX. Isolation of Q Fever Organisms From Parturient Placentas of Naturally Infected Dairy Cows

By LAURI LUOTO, D. V. M., M. P. H., and ROBERT J. HUEBNER, M. D.*

Epidemiological studies of Q fever in southern California among dairy and other livestock workers and residents near dairies have shown that factors other than the personal or household use of raw milk are required to explain Q fever infections (*1*, *2*). The general hypothesis most consistent with present knowledge postulates that large numbers of *Coxiella burnetii* must be contributed to dairy and other livestock environments from known or unknown reservoirs and that some of these organisms gain entry to exposed susceptible humans and animals through contact or inhalation.

Early studies demonstrated *C. burnetii* in the milk of many cows (*3*), spinose ear ticks, *Otobius megnini*, (*4*), and in the udder and adjacent lymph glands of an infected cow at autopsy (*5*). Other studies (*6*) indicated that the urine and feces of infected cows were unlikely sources of contamination of the environment with *C. burnetii*.

The demonstration of *C. burnetii* in parturient placentas of infected dairy cows is reported here, and the significance of this finding is discussed briefly.

Procedure

Since this preliminary study was concerned with the initial demonstration of *C. burnetii* in bovine placental tissues, only heifers and cows which on the basis of previous serological tests (*7*, *8*) were believed to be infected and in which parturition seemed imminent were selected for study. Three native [1] Los Angeles County dairy herds, containing a total of 2,300 cows, with infection rates varying from 16 percent to 30 percent provided the source of specimens. Although herd practices at these dairies were generally similar, basic differences did exist.

Placentas were collected from the uterus and vagina, from the floor of calving stalls, or from the ground of corrals following normal parturition. Clean portions were excised at random, placed in sterile jars, and kept frozen until tested in the guinea pig test (*8*). At that time specimens were thawed, and 1- or 2-gram portions were removed, ground in a mortar, and suspended in sufficient saline to approximate a 1:10 suspension. Each of two or three 600- to 800-gram guinea pigs were injected intraperitoneally with 3-ml. amounts of these suspensions. Normal uninjected guinea pigs were distributed among the test animals in a ratio of 1 control to 4 injected animals. All guinea pigs were bled 30 days later and the serums tested for complement-fixing antibodies against *C. burnetii.* A 3-plus reaction at 1:32 or greater dilution by the serums of one or more guinea pigs was accepted as evidence of infection and of the presence of *C. burnetii* in the specimens being tested.

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*From the Microbiological Institute of the National Institutes of Health, Bethesda, Md.

[1] For the purpose of the southern California studies, a "native dairy" is one which raises its own replacements for the milking herd.

A few attempts were made to establish placental strains by passage of guinea pig blood to other guinea pigs and to yolk sacs of fertile hen eggs. Titrations of placental materials were carried out to ascertain the amount of infection present in some placental tissues found positive by the guinea pig test.

Results

Placental tissues of 33 serologically positive [2] cows were tested and 13 (39 percent) found to contain *C. burnetii.* Ten were positive on initial guinea pig test, while 3 others were found positive when second portions of some placentas were tested (table 1). Similar attempts to demonstrate *C. burnetii* in placentas of 4 serologically negative cows were unsuccessful.

The presence of *C. burnetii* in the tissues was further demonstrated by production of fever and of Q fever antibodies in three groups of second-passage guinea pigs; by the cultivation of strains of *C. burnetii* from the blood of such guinea pigs in the yolk sacs of fertile hen eggs; and by the demonstration of immunity of guinea pigs recovered from Q fever, Dyer strain, (table 1).

Titrations indicated that some placental tissues diluted as high as 1 to 100,000,000 were infectious for guinea pigs (table 2).

Antibody against Q fever was found in the serums of 70 of 173 (40 percent) guinea pigs which were injected with placental suspensions, while 1 of 64 (1.5 percent) uninjected control guinea pigs was found to have developed similar antibody. It is felt that spontaneous infection in the guinea pig colony during this study was not frequent enough to interfere with interpretation of the guinea pig test results.

Discussion

The ease with which *C. burnetii* was demonstrated in small portions of placental tissues of 13 of 33 positive cows, as well as the results of the titration of portions of those tissues, makes it evident that placentas of some infected cows represent rich sources of *C. burnetii.*

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[2] Serologically positive cows included those showing complement-fixing antibody (3-plus at 1:4 or greater) in the serum prior to, at, or several months subsequent to parturition, or showing similar antibodies in colostrum taken at parturition.

The frequency of contamination of dairy environments would appear to depend upon the frequency of parturition and the number of infected cows in the dairy herds. In the Los Angeles County milkshed, great numbers of infected cows are concentrated on many dairies

Table 1. *Demonstration of* Coxiella burnetii *in parturient placentas of serologically positive*[1] *Los Angeles County dairy cows*

Dairy	Cow No.	Age	Breed	Number of parturitions	Results of guinea pig tests		Immunity test in recovered (Dyer strain) guinea pigs	Cultured in yolk sacs
					First	Second		
A	851	2.5	--------	1	+	--------	--------	--------
	1659	2.5	G	1	+	+	--------	--------
	3759	2.5	H	1	+	+	+	+
	4019	3	H	1	+	--------	--------	--------
	1799	3.5	H	1	+	--------	--------	--------
B	377	3.5	H	2	+	--------	--------	--------
	379	3.5	H	2	+	+	+	+
	165	5	H	3	0	--------	--------	--------
	178	5	G	3	0	--------	--------	--------
	87	6	H	4	0	--------	--------	--------
	1221	6	H	4	+	--------	--------	--------
	1569	6	H	4	0	0	--------	--------
	947	6	G	5	0	+	--------	--------
	569	9	G	7	0	--------	--------	--------
	436	9	H	7	0	--------	--------	--------
	1084	9	H	7	0	--------	--------	--------
	1776	9	G	7	0	--------	--------	--------
C	406	4	G	2	0	--------	--------	--------
	2095	4	G	2	0	--------	--------	--------
	2476	3	H	2	0	--------	--------	--------
	1473	6	H	3	+	--------	--------	--------
	1490	6	G	3	0	--------	--------	--------
	1590	5	H	3	0	+	--------	--------
	1609	6	H	3	0	--------	--------	--------
	1623	6	H	3	0	--------	--------	--------
	1865	6	H	3	0	+	--------	--------
	1950	5	H	3	+	+	+	+
	1998	5	H	3	0	--------	--------	--------
	1337	7	G	4	0	--------	--------	--------
	244	8	G	6	0	--------	--------	--------
	287	10	G	6	0	--------	--------	--------
	316	9	G	7	0	--------	--------	--------
	3825	11	H	8	0	--------	--------	--------

[1] Having serum or colostrum antibodies of 3-plus at 1:4 or greater in the complement fixation test.

+Positive in guinea pig test, immunity demonstrated, or strain successfully cultured.

0 Negative in guinea pig test.

Blank=not tested.

Table 2. *Titration of placental tissues in the guinea pig test for the presence of* Coxiella burnetii

Cow number	Dilution of placental tissues in saline									
	10^{-1}	10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-7}	10^{-8}	10^{-9}	10^{-10}
A 3759	--------	++±	+	++0	++±	+0	+±0	+±0	00	00
A 4019	--------	++	--------	+0	000	000	000	--------	--------	--------
B 121	--------	+++	--------	00	0	000	--------	--------	--------	--------
B 377	--------	+++	--------	+++	+±	+++	+0	--------	--------	--------
B 379	--------	++	++	+++	++	+	+00	+00	000	000

+ Guinea pig serum positive at 3-plus at 1:32 or greater in the complement fixation test 30 days after infection.

± Guinea pig serum showing 3-plus at 1:16 but not at 1:32 in the complement fixation test.

0 Guinea pig serum negative at 1:16 in complement fixation test.

(*1*), parturitions are frequent, and placentas are allowed to remain on the ground of open corrals. The dry climate in this area, together with the known ability of *C. burnetii* to survive desiccation, suggests that infected placentas may provide sporadic but excellent opportunities for the dissemination of viable organisms to the environments of both humans and animals. Furthermore, contamination of the hides of newborn calves by heavily infected placental membranes may occur and could be an important factor in the genesis of Q fever infection among abattoir and hide-plant workers.

Workers in Switzerland have recently reported that aborted placentas from goats produced serum antibodies against *C. burnetii* when injected in four guinea pigs (*9*). Strains were not established in the study. They presented the hypothesis that *C. burnetii* was responsible for an epidemic of abortions in goats.

C. burnetii infections of bovines under the conditions encountered in Los Angeles County dairy herds have not been associated with any apparent increased rates of abortion.

It can be seen in table 1 that *C. burnetii* was demonstrated more frequently during first parturitions than in later ones. The significance of this observation is undetermined because of the small and unequal sampling in the different herds and because of several attendant herd practices irrelevant to the main purpose of this report.

Summary

A number of parturient placentas of infected dairy cows have been shown to contain *C. burnetii*, sometimes in large quantities. This fact may be important in the spread of Q fever to susceptible persons and animals exposed to dairy and other livestock environments.

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Induced Oviposition of *Simulium* Flies by Exposure to CO_2

By HERBERT T. DALMAT[*]

In an experiment designed to determine without doubt the vectors of onchocerciasis in Guatemala and to study the development of *Onchocerca volvulus* in the anthropophilic species of blackflies (*Simulium* spp.), it was considered necessary to establish a laboratory colony of these flies. This project was undertaken at the field laboratory in San Pedro Yepocapa, Chimaltenango, Guatemala.

During the last half of 1948 a large outdoor screen cage, 8′ x 6½′ x 5′, was constructed in the laboratory patio over a cement channel through which a stream was diverted. Some of the plants found in and about the natural haunts of the flies were planted within the cage. These were: banana, coffee, *Grevillea robusta* Cunn., *Ricinus communis* L., and *Polymnia maculata* Cav. Two herbaceous plants on which the flies commonly oviposit in this region, *Renealmia aromatica* (Aubl.) Griseb. and *Tradescantia commelinoides* R. & S., were planted along the borders of the stream in such a manner that the leaves and stems floated on the water with the current. Temperature and humidity fell well within the natural range of the region. The mottled shade and sun, usually found on the coffee plantations, was approximated by attaching lengths of rather sheer black cloth to the outside of the cage where the sun hit directly. This reduced light intensity, and the movement of the cloth in the air currents afforded additional aeration of the interior of the cage.

Many combinations of flies were introduced into the cage: wild-caught females, wild-caught females with laboratory-raised males, laboratory-raised females and males. Pupae were also introduced into the water channel so that adults could emerge naturally within the cage. The flies were permitted to feed on human subjects, defibrinated human blood, blood plasma, plant juices, and honey and sugar solutions absorbed by cotton. Although small numbers of flies lived up to 18 days in captivity, not one fly oviposited.

During the latter part of January 1950, a system was initiated whereby flies were treated with carbon dioxide gas before being released in the cage.[2] The flies were first placed in a museum jar into which carbon dioxide gas was introduced through a rubber tube extending from a standard gas cylinder. An oxygen manometer valve was used to control the quantity of carbon dioxide passing through the tubing to the fly chamber.

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[*] From the Microbiological Institute of the National Institutes of Health, Public Health Service. This report is part of a study jointly supported by the Laboratory of Tropical Diseases of the Microbiological Institute and the Pan American Sanitary Bureau in cooperation with the Dirección General de Sanidad Pública of the Republic of Guatemala. The project was aided by a research grant from the National Institutes of Health, Bethesda, Md.

Since the actual volume of gas necessary to immobilize the flies was not measurable with the equipment used, the end-point of treatment was arrived at by observation of the fly activity. The flies were at first stimulated to greater activity, and then they would topple over as if dead. At the latter point, the treatment was halted and the jar left open until the flies revived. The actual treatment lasted for less than 20 seconds; the flies usually revived in about 3 to 4 minutes.

It appears that the gas treatment has an immediate effect upon the behavior of the flies. Upon returning to consciousness, a few flies were observed mating, and numerous females assumed a position as though they were biting. It was first believed that the position of the females, with the mouth-parts directed perpendicularly to the jar, was merely an attempt to establish their equilibrium. However, when the flies were released into the large outdoor cage, a high percentage of the flies attacked the human subject and took blood voraciously. Within 4 to 6 hours, a number of the flies that had fed also oviposited.

To date, 19 trials have been made. Of the 2,532 flies treated, 982 were *S.* (*S.*) *ochraceum* Walker; 1,112 were *S.* (*S.*) *metallicum* Bellardi; and 438 were *S.* (*Lanea*) *callidum* D. & S. Of this number, 84 took blood meals, and 21 *metallicum* and 11 *callidum* oviposited. Some of the females deposited up to a thousand eggs, but none of the eggs have developed to form larvae. This may be partly due to the frequent interruption in the flow of water occasioned by necessary repair work on the water system. It may also indicate that the eggs were sterile or that the gas adversely affected them. In the future, varying dosages of carbon dioxide will be tried to preclude possible deleterious effects of overtreatment.

Although the eggs deposited by flies treated with carbon dioxide have not developed to date, the results so far obtained are encouraging. Experimental induction of egg-laying by captive *Simulium* flies has never before been reported; thus, these results point a way toward further possible experimentation along the same line with this group of flies and with other insects that have resisted colonization.

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[2] W. H. W. Komp, Laboratory of Tropical Diseases, NIH, suggested the possible use of this technique, which has previously been tried with mosquitoes (unpublished) by Dale W. Jenkins, Entomology Section, Army Chemical Center, Maryland.

New *Salmonella* Type: *Salmonella allandale*

By P. R. Edwards and G. J. Hermann*

Salmonella allandale was isolated by Mrs. Mildred M. Galton from the feces of a normal foodhandler and forwarded to the writers for identification. The organism was a motile rod which possessed the usual characteristics of the genus *Salmonella.* Upon biochemical examination the bacterium produced hydrogen sulfide and utilized d-tartrate and citrate, but failed to form indol or to liquefy gelatin. Glucose, arabinose, xylose, maltose, trehalose, mannitol, dulcitol, sorbitol, and inositol were fermented within 24 hours with the production of acid and gas. Acid was produced from cellobiose after 8 days' incubation. Rhamnose, lactose, sucrose, salicin, and adonitol were not fermented after 30 days' incubation.

Serological examination revealed that the organism was agglutinated strongly by *Salmonella riogrande* O serum (XL) and to a lesser extent by O sera derived from *Salmonella paratyphi A* and *Salmonella senftenberg.* It was shown that agglutination in the latter sera was due to the presence of antigen I in *S. allandale,* and that, as in many other types, form variation affecting antigen I occurred in the culture. *S. allandale* did not possess the whole antigenic complex represented by the symbol XL in *S. riogrande,* although it was agglutinated to the titer of *S. riogrande* serum and reduced the titer of the serum from 1:1,000 to 1:200 in absorption tests. Likewise, *S. riogrande* failed to absorb completely the agglutinins from O serum prepared from *S. allandale,* although it reduced the titer of the serum from 1:8,000 to 1:200. For diagnostic purposes the O antigens of *S. allandale* may be represented by the symbols I,XL.

The H antigens of *S. allandale* were diphasic. Phase 1 was agglutinated to the titer of *Salmonella thompson* phase 1 serum (k) and removed all agglutinins from the serum in absorption tests. Phase 2 was agglutinated by sera derived from the nonspecific phases of the genus. When tested in absorbed sera for factors 2, 3, 5, 6, and 7, it was agglutinated only in serum for factor 6. In absorption tests, *S. allandale* reduced the titer of *Salmonella anatum* phase 2 serum (1, 6) from 1:10,000 to 1:100. The antigenic formula of *S. allandale* may be expressed as I,XL:k–1,6.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APRIL 1, 1950

Influenza

Reports for the week ending April 1 indicate that the moderate influenza epidemic experienced in many areas during the past 7 weeks has passed its peak. There were 19,951 cases of influenza reported for the latest week compared with 26,505 cases for the preceding week. These figures exclude Kentucky for which data are not yet available.

The cumulative total of reported influenza cases for the first 13 weeks of this year is 190,910, which may be compared with the corresponding total of 55,545 cases for the same period in 1949 and 206,585 for 1947, the highest during the last 5 years. The corresponding 5-year (1945–49) median is 121,275.

The following States reported relatively large increases in influenza cases for the latest week over the preceding week: Ohio (3 to 41), Kansas (51 to 184), Arkansas (2,241 to 3,013), Arizona (172 to 302), and Washington (18 to 253).

Substantial decreases in reported cases are shown for the following States: Maine (1,058 to 124), New York (86 to 42), New Jersey (49 to 21), Iowa (353 to 101), Missouri (184 to 108), Maryland (116 to 67), Virginia (6,109 to 3,688), West Virginia (2,275 to 1,669), Georgia (371 to 173), Tennessee (722 to 485), Oklahoma (1,022 to 696), Texas (8,750 to 7,033), and Montana (625 to 60). In summary, 10 States reported increases, 30 States (including the District of Columbia) reported decreases, and 9 States reported no change.

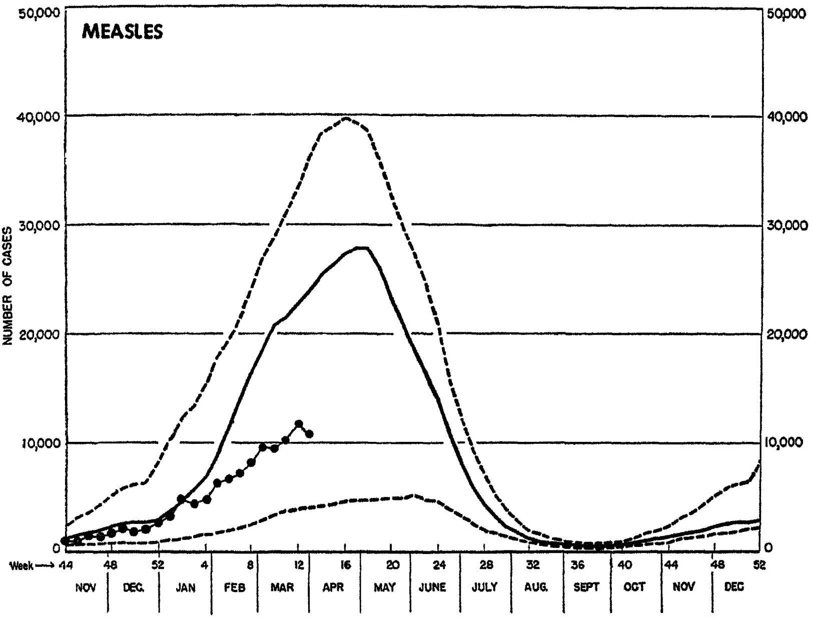
Other notifiable diseases

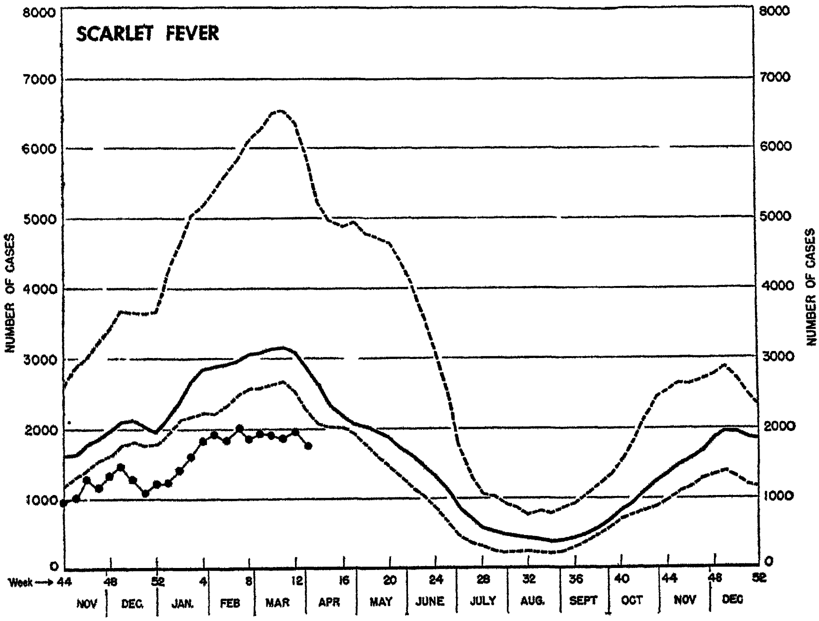
Increases in reported cases over the preceding week are reported for the following diseases: Anthrax (0 to 2), meningococcal meningitis (116 to 118), acute poliomyelitis (62 to 64), Rocky Mountain spotted fever (0 to 1), and smallpox (1 to 4). The 4 cases of smallpox were reported in Oklahoma.

Decreases compared with the preceding week are indicated for the following diseases: Diphtheria (114 to 110), acute infectious encephalitis (17 to 13), measles (11,940 to 10,964), pneumonia (3,147 to 3,089), scarlet fever (1,993 to 1,752), tularemia (19 to 15), typhoid and paratyphoid fever (48 to 44), and whooping cough (2,901 to 2,810).

Communicable Disease Charts

All reporting States, November 1949 through April 1, 1950





The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 5 preceding years. The solid line is a median figure for the 5 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks, 1949–50.

Telegraphic case reports from State health officers for the week ended April 1, 1950

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain Spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	---	---	124	25	1	5	---	---	16	---	---	---	47	---
New Hampshire	---	---	2	2	---	3	---	---	4	---	---	---	---	---
Vermont	---	---	---	7	---	---	---	---	2	---	---	---	44	---
Massachusetts	2	---	---	508	3	---	1	---	130	---	---	2	169	---
Rhode Island	---	---	1	14	---	8	---	---	8	---	---	---	---	---
Connecticut	---	---	4	60	1	67	---	---	26	---	---	---	124	---
MIDDLE ATLANTIC														
New York	6	4	[2] 42	1, 243	7	425	1	---	[3] 181	---	---	2	176	16
New Jersey	---	---	21	1, 082	8	148	---	---	79	---	---	1	165	---
Pennsylvania	4	---	---	523	16	116	---	---	145	---	---	3	154	---
EAST NORTH CENTRAL														
Ohio	16	---	41	414	6	109	2	---	223	---	---	1	269	12
Indiana	3	---	8	351	2	43	1	---	74	---	1	1	47	[4] 24
Illinois	2	1	20	436	8	233	3	---	86	---	---	---	113	3
Michigan	---	1	7	1, 439	---	18	3	---	106	---	---	---	155	4
Wisconsin	1	---	225	449	2	33	---	---	75	---	---	1	140	---
WEST NORTH CENTRAL														
Minnesota	---	---	2	60	3	10	---	---	40	---	---	---	21	---
Iowa	1	---	101	546	---	1	1	---	4	---	---	---	22	11
Missouri	---	---	108	42	5	26	1	---	33	---	---	1	29	---
North Dakota	---	3	65	2	2	85	---	---	5	---	---	---	3	---
South Dakota	---	---	---	7	1	1	---	---	5	---	---	---	4	---
Nebraska	---	---	8	167	---	---	---	---	5	---	---	---	1	---
Kansas	3	---	184	24	---	31	1	1	23	---	---	---	20	---
SOUTH ATLANTIC														
Delaware	---	---	---	4	---	---	---	---	3	---	---	---	4	---
Maryland	5	---	67	27	3	57	---	---	28	---	---	4	51	---
District of Columbia	---	---	1	79	---	18	---	---	3	---	---	---	4	---
Virginia	---	---	3, 688	79	4	134	---	---	11	---	---	---	49	8
West Virginia	3	---	1, 669	219	5	39	2	---	12	---	---	1	45	16
North Carolina	8	---	---	175	5	---	3	---	24	---	1	1	71	---
South Carolina	2	---	286	64	2	14	---	---	5	---	---	1	10	10
Georgia	---	1	173	245	2	177	1	---	4	---	3	2	17	7
Florida	2	---	20	126	---	9	2	---	1	---	---	---	3	---

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended March 18, 1950.—Cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	1	-------	28	25	380	244	44	23	24	119	888
Diphtheria	-------	-------	-------	-------	6	2	-------	-------	-------	-------	8
Dysentery, bacillary	-------	-------	-------	-------	1	6	2	-------	-------	3	12
German measles	-------	-------	114	-------	14	885	-------	38	207	232	1,490
Influenza	-------	-------	20	-------	-------	658	5	-------	-------	2	685
Measles	-------	-------	7	347	672	688	9	33	35	89	1,880
Meningitis, meningococcal	-------	-------	-------	-------	-------	1	1	-------	-------	-------	2
Mumps	-------	-------	133	-------	224	588	11	52	150	322	1,480
Poliomyelitis	-------	-------	-------	-------	-------	-------	-------	1	-------	-------	1
Scarlet fever	2	-------	6	2	82	35	23	3	70	8	231
Tuberculosis (all forms)	9	-------	11	14	113	35	18	11	20	41	272
Typhoid and paratyphoid fever	-------	-------	-------	-------	9	2	-------	1	-------	1	13
Undulant fever	-------	-------	-------	-------	4	1	1	-------	-------	-------	6
Venereal diseases:											
Gonorrhea	4	-------	10	18	71	51	20	13	18	(1)	205
Syphilis	2	-------	9	4	78	30	3	2	6	(1)	134
Whooping cough	1	-------	33	-------	109	45	7	-------	-------	48	243

[1] Report not received.

JAMAICA

Notifiable diseases—4 weeks ended January 28, 1950, and 4 weeks ended February 25, 1950.—Cases of certain notifiable diseases were reported in Jamaica as follows:

Disease	4 weeks ended Jan. 28, 1950	4 weeks ended Feb. 25, 1950		Disease	4 weeks ended Jan. 28, 1950	4 weeks ended Feb. 25, 1950	
	Jamaica [1]	Kingston	Other localities		Jamaica [1]	Kingston	Other localities
Chickenpox	24	9	27	Plague	1	-------	-------
Diphtheria	7	-------	3	Puerperal sepsis	1	-------	2
Dysentery, unspecified	5	2	-------	Scarlet fever	3	-------	-------
Erysipelas	1	-------	-------	Tuberculosis, pulmonary	68	29	57
Leprosy	-------	1	1	Typhoid fever	53	4	51
Meningitis, meningococcal	3	-------	1	Typhus fever, murine	2	1	-------

[1] Figures not received separately for Kingston and other localities.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—The following reports include only items of unusual incidence or special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Burma.—During the week ended March 18, 1950, 1 case of cholera was reported in Rangoon.

India.—According to information dated March 29, 1950, a marked increase in the incidence of cholera has been reported in Calcutta. For the week ended March 18, 253 cases, with 105 deaths, were reported in that city (199 cases, 62 deaths during the previous week). During the week ended March 25, the number of cases reported was 312, with 114 deaths.

Pakistan.—According to information dated April 4, 1950, an outbreak of cholera was being reported currently in Dacca. Fifty cases, with a death rate of 25 percent, were stated to have occurred in that city within the week preceding the above date. An average of 6 cases daily, with the incidence increasing, was reported. Cholera has also been reported in Chittagong as follows: Week ended March 18, 1950, 6 cases (all fatal); week ended March 25, 11 cases.

Plague

China.—During the period January 13–February 24, 1950, 15 cases of plague, with 9 deaths, were reported in Kwangtung Province.

Ecuador.—During the month of February 1950, 3 cases of plague, one fatal, were reported in Loja Province.

Smallpox

Burma.—During the week ended March 18, 1950, 106 cases of smallpox were reported in Rangoon, and 47 cases in Bassein.

Chile.—Information dated April 3, 1950, states that an epidemic of smallpox has been reported in Chile, apparently centered in the South Central regions, especially the Talca and Concepcion areas. One hundred thirty-three known cases had been reported as of April 2.

China.—During the week ended March 25, 1950, 19 cases of smallpox were reported in Shanghai.

French West Africa.—During the period March 1–10, 1950, 131 cases of smallpox were reported in Ivory Coast.

India.—During the week ended March 25, 1950, 319 cases of smallpox, with 252 deaths, were reported in Calcutta.

Typhus Fever

Japan.—During the week ended March 11, 1950, 21 cases of typhus fever were reported in Yokohama, and 7 cases in Tokyo.

DEATHS DURING WEEK ENDED APR. 1, 1950

	Week ended Apr. 1, 1950	Corresponding week, 1949
Data for 94 large cities of the United States:		
Total deaths	10,328	9,819
Median for 3 prior years	9,819	
Total deaths, first 13 weeks of year	129,286	128,641
Deaths under 1 year of age	648	654
Median for 3 prior years	682	
Deaths under 1 year of age, first 13 weeks of year	8,199	8,696
Data from industrial insurance companies:		
Policies in force	69,835,573	70,499,503
Number of death claims	14,552	13,318
Death claims per 1,000 policies in force, annual rate	10.9	9.9
Death claims per 1,000 policies, first 13 weeks of year, annual rate	9.9	9.8

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

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Public Health Reports

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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Public Health Reports

Vol. 65 • APRIL 28, 1950 • *No. 17*

Statistical Studies of Heart Disease

VI. Age at Onset of Heart and Other Cardiovascular-Renal Diseases

By THEODORE D. WOOLSEY*

In this study an attempt is made to find by an indirect method the age at onset (strictly speaking, the age at first diagnosis) of cases of heart and other types of cardiovascular-renal diseases occurring in the general population. The results of a direct approach to this question were published in the fifth report of this series (*9*). There, the cases found in a surveyed population were classified by age and also according to whether disability resulted and, if so, whether the disability had had its first onset during the period of study. The period of study was defined as the 12 months preceding the visit of an interviewer.

The data for that direct approach and also for the approach described in this report were taken from the National Health Survey of 1935–36. The health survey procedures have been described in detail elsewhere (*1*), and it is sufficient to repeat here that the survey involved a single visit to each of some 700,000 households in urban communities in 18 States by interviewers who recorded the illness experienced in the household over a period of a year prior to the day of the visit. The types of cases recorded were as follows:

1. Disabling cases existing on the day of the visit, and all cases of chronic illness, whether or not disabling (that is, unable to work or perform usual activities, such as going to school, housework, and so forth).
2. Cases that had caused seven or more consecutive days of disability during the year prior to the visit.
3. Hospital cases in the year prior to the visit, regardless of the number of days of disability.
4. Cases resulting in death during the year, regardless of the duration of disability.

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*Biostatistician, Division of Public Health Methods, Public Health Service. This series of papers dealing with the statistics of heart disease morbidity and mortality is the result of a joint study undertaken by the Division of Public Health Methods and the National Office of Vital Statistics and is now being financed in part by the National Heart Institute.

The informant in the household, usually the housewife, naturally could report only on illness of which she was aware among household members and could only pass on to the interviewer such diagnoses as the physician had given to the family, or (in the case of minor illnesses and accidents) such as the family knew or suspected as a result of their own education or experience. In a subsample of cases the family diagnosis was sent for verification to the physician who had been in attendance. The results of this check give one basis for estimating the maximum completeness of counting of cases of heart and other diseases. (See appendix to fifth report (*9*) of this series.)

The number of cases with onset of disability occurring during the study year and with no history of a previous attack (which will be called here simply "onset within—no previous attack") gave a measure of the incidence in the surveyed population of new cases causing disability of seven or more consecutive days in the year of their onset.[1] Such figures, even if one takes into account the lack of completeness in the counting of heart disease cases obtained from a household survey, should give a fairly accurate picture of the general pattern of onset of disabling heart disease according to age. The same would be true for the other cardiovascular-renal diseases considered.

However, it was felt that the question of age at onset might be approached in another manner—a manner which did not depend upon knowing whether a particular case did or did not originate during the study year and which made use of all cases recorded during the survey, including those causing no disability and those having their onset before the study year.

It should be recognized that when the cases that caused no disability during the study year are included, an entirely new and, in general, less severe type of case is added. Fifty-two percent of the cases of heart disease existing on the day of the visit had caused no disability during the preceding year. (The corresponding percentages for hypertension, including intracranial lesions and arteriosclerosis, and for nephritis, including other forms of kidney disease as well, were 62 and 46, respectively.) Furthermore, 39 percent had not even caused a restriction of activity in the preceding year. (Corresponding percentages were 51 for hypertension and 38 percent for nephritis.)[2] It seems likely that some of these nondisabling cases (particularly those originating within the last year) were discovered, not by the onset of symptoms and a trip to the doctor's office, but as a result of a physical examination taken, perhaps, in connection with a job or school attendance. It is natural to expect that the age at "onset," meaning the age of discovery, of such cases would differ from the age at onset of cases causing seven or more days of disability during the study year. Nevertheless, the more inclusive universe of cases considered here is also of interest, particularly since the nondisabling cases of one age may be the disabling cases of a later age.

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[1] Actually these "onset within—no previous attack" cases as used in this paper include three types of new cases of less than 7 days of consecutive disability: (1) cases in which the onset of disability was less than 7 days prior to the visit and in which the person was still disabled; (2) cases involving hospitalization, which were included regardless of the duration of disability; and (3) cases resulting in death even though death was not preceded by as long as a week of disability.

[2] These proportions are for cases at all ages combined. The proportions were found to be lower for advanced ages (and also lower for the cases at younger ages which were, however, much less numerous). See figures 5, 6, and 7 in reference (*9*).

An unduplicated count of all cases and deaths from heart or other cardiovascular-renal disease recorded in the National Health Survey is very close to a prevalence type of count of recognized cases as of the first day of the year prior to the interviewer's visit. To the extent that cases first diagnosed during the year are included, the unduplicated count is an overestimate of prevalence at the beginning of the year. Since "all recorded cases" is defined to include deaths during the year, the total of all cases would also represent an overcount of the prevalence at the end of the year. However, this overcounting is almost certainly more than counterbalanced by the natural underenumeration inherent in the survey method for which no precise correction factor is available. See appendix to reference (*9*). Hence, in this analysis the count of all recorded cases of heart disease, hypertension, and nephritis was assumed to be the true prevalence of each of these diseases, the ages of the surveyed population being taken as of the beginning of the study year.[3]

The term heart disease is taken to include all forms of heart disease (and undifferentiated heart disease) except syphilitic and thyrotoxic heart disease. Hypertension includes high blood pressure, arteriosclerosis, and intracranial lesions, such as cerebral hemorrhage. Nephritis includes all types of kidney disease, but chronic nephritis cases form by far the largest proportion in this category.

The procedure followed in order to find the curve of incidence of these diseases by age, starting with the curve for "all recorded cases" is described in detail in the appendix to this report. It adheres quite closely to the method used by Spiegelman and Marks to estimate the age and sex distribution of the new diabetic cases expected in the population of the United States each year (*2*). The method makes certain assumptions. It assumes that:

1. The members of the survey population and of the general population acquire the disease at about the same ages.
2. The prevalence found at each age at the time of the survey has arisen as the result of a fixed rate of onset at each age in the population under observation and a fixed rate of dying at each

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[3] For example, the total of all cases recorded among persons stating that they were 56 years of age at the time of the survey was considered to be the prevalence among persons 55½ years of age, because at the time of the survey these people were actually 56½ years of age, on the average. At the beginning of the study year they were, of course, 1 year younger.

age among persons with the disease, both of these fixed sets of rates having been operative over a long period of time (the human life span).

3. A person having once acquired the disease would never during his lifetime be reported as free of this disease; thus, the number of persons at age x who are stated to have the disease represents the total number who acquired it before age x and survived to age x.

Other less fundamental assumptions made in this report will be discussed in the appendix, but those described above are the chief assumptions necessary to an evaluation of the results.

The first assumption seems sound on intuitive grounds for the cardiovascular-renal diseases except for the fact that the population studied was entirely urban. It is quite possible that the age at onset does differ in urban and rural areas but, since the age at which the disease is detected and diagnosed also differs, it would be almost impossible to determine by a household survey whether an apparent difference in age at onset was real or whether it resulted from noncomparability in amount of medical attention received. In any case, no adequate data for rural areas are available.

The second assumption is not valid if there has been a marked trend in the rate of onset (incidence) or the rate of dying (case fatality) but, whatever the trend, the results will depict an average of the experience over a long period of time. There is very little evidence on the matter of a trend in the incidence of heart disease. The apparent trend in the mortality from heart disease may quite possibly be entirely artificial.[4] The same holds true for the other cardiovascular-renal diseases.

There are definite signs that the third assumption is not in accord with the actual situation for heart disease and nephritis at the younger ages. It is not uncommon for rheumatic valvular heart disease to be inactive for periods averaging 10 to 12 years (*4*), and persons in this inactive stage might easily not be reported to an interviewer as having heart disease. However, this disagreement with the assumption is only noticeable in the prevalence rates at the early ages of life, and beyond age 30 the rheumatic valvular disease begins to be submerged in the larger number of cases of arteriosclerotic and hypertensive heart disease. Thus, it is safe to say that as age increases beyond 30 the assumption is satisfied in all except an insignificant proportion of the cases.

The disagreement with the third assumption is greater in the case of nephritis and probably less in magnitude and certainly of less importance in the case of hypertension. Acute cases of nephritis were not distinguished from chronic nephritis in the tabulations made from the National Health Survey because of the high proportion of undifferentiated "nephritis" and "kidney trouble" that made up the kidney category. Acute nephritis is fairly common in childhood and at early adult ages. Recovery is complete in many of these cases. Hence, the number stated to have nephritis at age 40, for example, is less than the number who acquired it before that age and survived to their 40th birthday. The effect of this departure from the assumptions upon the computation of incidence is shown below.

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[4] See the second report (*6*) of this series for a discussion of the trend of mortality from the cardiovascular-renal diseases in the United States.

Incidence of the Cardiovascular-Renal Diseases

Table 1 and figures 1, 2, and 3 show the estimated incidence in new cases per 100,000 population of heart disease, hypertension, and nephritis by age and sex. The method of estimation and data used are described in the appendix. In the graphs different parts of the age curves are plotted on different scales with an overlapping at the middle years of life. The right-hand curve, which should be read against the right-hand scale, shows the general shape of the entire curve and the very sharp increase in the incidence of all three of these diseases, or disease groups, with age. The left-hand curve, which makes it possible to study in more detail the shape of the curve and the sex differences at the younger ages, should be read against the left-hand scale.

Table 1. *Estimated annual rate of incidence (number of new cases per 100,000 population per year) for all cases of heart disease, hypertension and nephritis by age and sex, based on data from the National Health Survey of 1935–36*

Age in years	Heart disease[1]		Hypertension[1]		Nephritis[1]	
	Male	Female	Male	Female	Male	Female
5–9[2]	59	74	1	4	39	16
10–14	42	55	12	14	14	(3)
15–19	3	36	25	42	10	16
20–24	26	55	37	53	21	44
25–29	74	115	52	67	33	44
30–34	152	157	75	117	52	55
35–39	223	206	109	199	73	78
40–44	302	274	197	323	91	85
45–49	480	397	314	540	148	129
50–54	829	678	548	683	246	237
55–59	1,535	1,024	912	873	384	334
60–64	2,087	1,511	1,465	1,190	643	499
65–69	3,046	2,440	2,271	1,737	1,083	774
70–74	4,236	3,430	3,340	2,655	1,611	1,314
75–79	6,061	4,844	5,350	3,868	2,508	2,152
80–84	9,751	8,057	9,896	7,398	4,420	3,867
85–89	14,959	17,601	17,411	18,644	9,663	9,141

[1] Rates for the three disease groups are not additive because one person may have more than one disease.
[2] Rates for "Under 5 years" and "90 years and over" not shown because of their probable unreliability.
[3] Less than 0.5 per 100,000.

On the same graphs will be found the rates for new cases ("onset within—no previous attack") disabling for seven or more consecutive

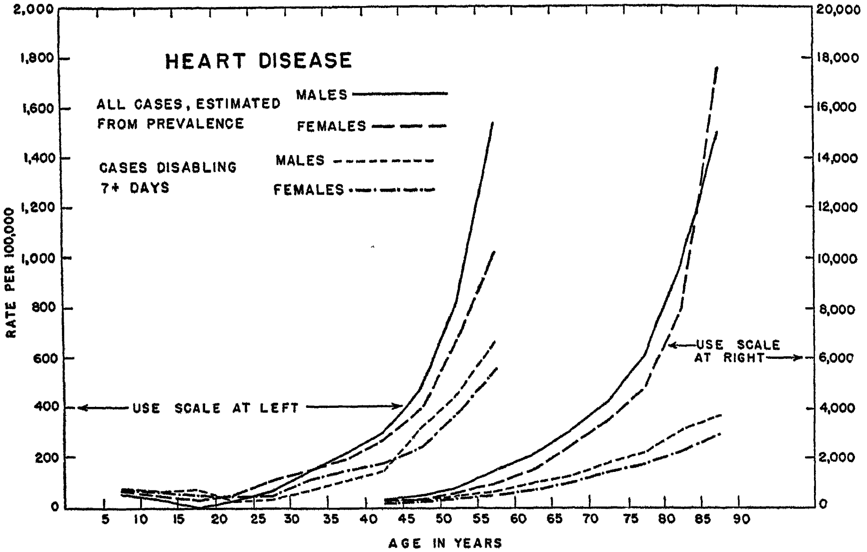

Figure 1. Estimated annual incidence rates (per 100,000 population) for heart disease (all forms) by age and sex, from National Health Survey.

days, discussed above. Since these latter cases constitute, by definition, only a part of the total incidence, it would seem necessary that the curve for disabling cases should over its entire length be below that for all new cases. The circumstance that it crosses the curve for all new cases at the younger ages is due to the fact that the third of the

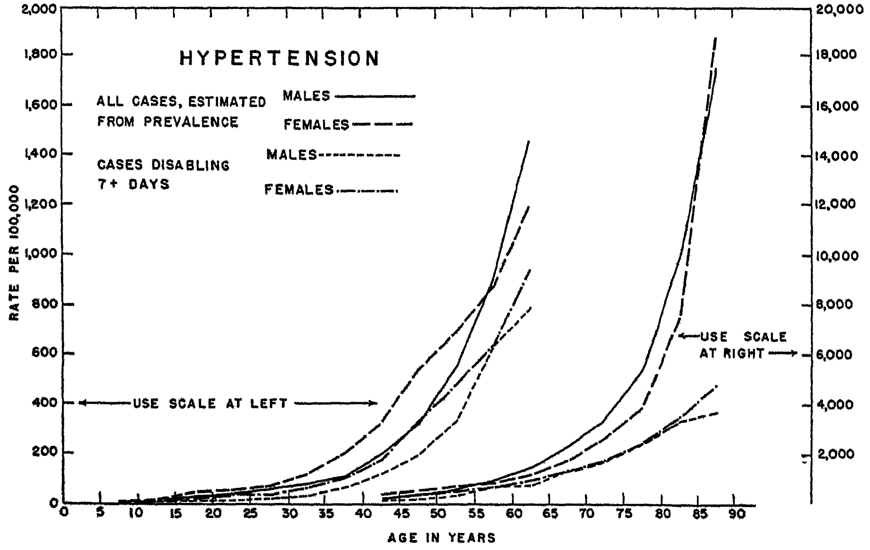

Figure 2. Estimated annual incidence rates (per 100,000 population) for hypertension (including intracranial lesions of vascular origin) by age and sex, from National Health Survey.

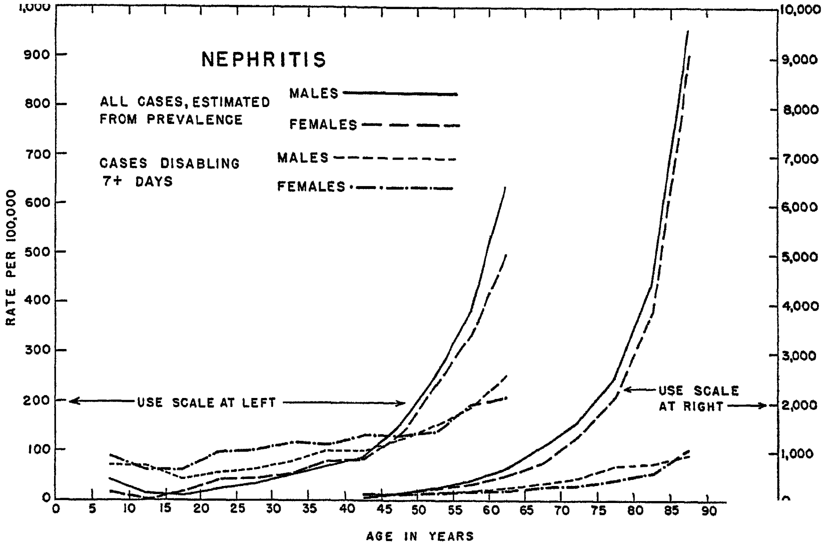

Figure 3. Estimated annual incidence rates (per 100,000 population) for nephritis (all forms) by age and sex, from National Health Survey.

assumptions made in the construction of the curve for all new cases is not well satisfied at the younger ages, as has been mentioned. This crossing over does not occur in the case of hypertension except at the youngest age group shown, 5 to 9 years, indicating that the agreement with assumption may be better in the case of this disease group. On the other hand, the nephritis curves cross over between 40 and 50 years of age which can be attributed to the predominance of non-chronic types of nephritis below middle life.

The extent of difference at any given age between the incidence of all new cases, as estimated, and the incidence of new cases disabling seven or more days during the study year, as computed directly from the tabulations, is a function of several variables and should not be interpreted too exactly. Briefly, the factors that influence this difference are:

1. The proportion of all new cases of cardiovascular-renal disease at any one age that cause disability in the calendar year of onset;
2. The difference in reliability of a rather complex estimate with several broad assumptions and a simple series of rates computed from the tabulations;
3. The probable relative incompleteness of counting of new cases ("onset within—no previous attack") disabling for seven days or more in the past year when compared with the counting of persons having the condition on the day of visit of the interviewer, the estimates for the all-cases curve being based upon the latter.

Two further remarks should be made to clarify the interpretation of these curves. First, the incidence for the three disease groups at any given age is not additive, because there is a considerable degree of overlapping in these closely related chronic conditions. (For a discussion of the extent of this overlapping, see reference (*9*), and particularly figure 1 in that report.)

Table 2a. *Crude abridged life table showing how many out of 100,000 infants of each sex can be expected to acquire heart disease between specified birthdays; and certain other measures of heart disease incidence and mortality from the life table*

[See text for complete description]

Exact age x (1)	Prevalence of heart disease (per head) at exact age x (National Health Survey) (2)		Number still living at exact age x (1939–41 life table) (3)		Number living at exact age x who have heart disease (4)		Number acquiring heart disease between exact age x and $x+5$ (5)	
	Male	Female	Male	Female	Male	Female	Male	Female
0	0	0	100,000	100,000	0	0	(1)	(1)
5	.00395	.00330	93,624	94,848	370	313	277	349
10	.00582	.00585	93,054	94,402	542	552	193	259
15	.00670	.00745	92,508	94,000	620	700	16	169
20	.00540	.00795	91,617	93,293	495	742	118	254
25	.00482	.00920	90,385	92,322	436	849	334	529
30	.00608	.01275	89,009	91,182	541	1,163	669	710
35	.00957	.01710	87,371	89,810	836	1,536	965	916
40	.01362	.02195	85,246	88,092	1,161	1,934	1,266	1,192
45	.01702	.02720	82,336	85,856	1,401	2,335	1,929	1,677
50	.02155	.03360	78,254	82,828	1,686	2,783	3,131	2,742
55	.03070	.04475	72,627	78,708	2,230	3,522	5,297	3,895
60	.04995	.05805	65,142	73,093	3,254	4,243	6,324	5,249
65	.06755	.07460	55,776	65,523	3,768	4,888	7,665	7,408
70	.09020	.10035	44,588	55,449	4,022	5,564	8,117	8,433
75	.10970	.11915	31,864	42,425	3,495	5,055	7,679	8,481
80	.12360	.12285	18,995	27,524	2,348	3,381	6,599	8,253
85	.12435	.11925	8,693	13,972	1,081	1,666	4,022	7,975
90	---------	---------	2,787	5,044	283	579	---------	---------

Exact age x (1)	Number dying *with* heart disease between exact age x and $x+5$ (6)		Chances in 100 of acquiring heart disease between exact age x and $x+5$ (7)		Chances in 100 of acquiring heart disease between exact age x and $x+1$ (8)		Chances in 100 of ever acquiring heart disease after exact age x (9)	
	Male	Female	Male	Female	Male	Female	Male	Female
0	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
5	105	110	.30	.37	.06	.09	58.55	61.87
10	115	110	.21	.28	.05	.07	58.72	61.95
15	141	126	.02	.18	.02	.04	58.91	62.04
20	177	148	.13	.27	.00	.02	59.39	62.36
25	229	214	.37	.58	.05	.10	60.03	62.82
30	374	337	.76	.79	.13	.14	60.66	63.24
35	640	519	1.12	1.04	.19	.18	61.24	63.69
40	1.026	792	1.51	1.38	.27	.25	61.88	64.19
45	1,644	1.229	2.38	2.01	.39	.34	62.72	64.79
50	2.587	2,004	4.09	3.43	.67	.56	63.78	65.51
55	4,272	3,174	7.52	5.18	1.37	.92	64.92	66.09
60	5,811	4,603	10.22	7.62	1.89	1.31	65.29	66.52
65	7,415	6,732	14.74	12.22	2.74	2.16	65.53	66.88
70	8.645	8,941	20.01	16.90	4.02	3.30	65.12	66.44
75	8,827	10,153	27.07	22.69	5.54	4.64	64.51	66.12
80	7,866	9,969	39.64	34.18	8.90	6.74	63.80	67.22
85	4,819	9,062	52.84	64.81	13.73	13.99	52.84	64.81
90	---------	---------	---------	---------	---------	---------	---------	---------

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[1] Values for ages from birth to 5 years considered too unreliable to be useful.

Second, it should be made clear that in the rates for both the disabling and total cases the population in the denominator contains some persons who already have heart disease, hypertension, or nephritis, or more than one of these diseases. Hence, they do not represent probabilities that persons free of the particular disease at a given age will acquire it within a specified interval of time. Such

Table 2b. *Crude abridged life table showing how many out of 100,000 infants of each sex can be expected to acquire hypertension between specified birthdays; and certain other measures of hypertension incidence and mortality from the life table*

[See text for complete description]

Exact age *x* (1)	Prevalence of hypertension (per head) at exact age *x* (National Health Survey) (2)		Number still living at exact age *x* (1939–41 life table) (3)		Number living at exact age *x* who have hypertension (4)		Number acquiring hypertension between exact age *x* and *x*+5 (5)	
	Male	Female	Male	Female	Male	Female	Male	Female
0	0	0	100,000	100,000	0	0	(1)	(1)
5	.00030	.00015	93,624	94,848	28	14	3	19
10	.00022	.00030	93,054	94,402	20	28	54	68
15	.00064	.00090	92,508	94,000	59	85	117	197
20	.00148	.00270	91,617	93,293	136	252	168	246
25	.00258	.00490	90,385	92,322	233	452	233	307
30	.00400	.00765	89,009	91,182	356	698	330	529
35	.00600	.01250	87,371	89,810	524	1,123	471	887
40	.00870	.02045	85,246	88,092	742	1,801	828	1,404
45	.01360	.03240	82,336	85,856	1,120	2,782	1,263	2,281
50	.02030	.05070	78,254	82,828	1,589	4,199	2,070	2,761
55	.03140	.06900	72,627	78,708	2,280	5,431	3,147	3,320
60	.04710	.08710	65,142	73,093	3,068	6,366	4,441	4,133
65	.06680	.10720	55,776	65,523	3,726	7,024	5,715	5,273
70	.08760	.13080	44,588	55,449	3,906	7,253	6,399	6,526
75	.10485	.15000	31,864	42,425	3,341	6,364	6,778	6,772
80	.11580	.15120	18,995	27,524	2,200	4,162	6,697	7,578
85	.12360	.14380	8,693	13,972	1,074	2,009	4,681	8,448
90	----------	----------	2,787	5,044	365	681	----------	----------

Exact age *x* (1)	Number dying *with* hypertension between exact age *x* and *x*+5 (6)		Chances in 100 of acquiring hypertension between exact age *x* and *x*+5 (7)		Chances in 100 of acquiring hypertension between exact age *x* and *x*+1 (8)		Chances in 100 of ever acquiring hypertension after exact age *x* (9)	
	Male	Female	Male	Female	Male	Female	Male	Female
0	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
5	11	6	<.005	.02	(2)	.01	46.36	53.51
10	16	13	.06	.07	.01	.01	46.64	53.75
15	40	28	.13	.21	.02	.03	46.88	53.94
20	72	44	.18	.26	.03	.05	47.25	54.24
25	109	59	.26	.33	.04	.06	47.76	54.66
30	162	104	.37	.58	.06	.09	48.30	55.16
35	254	210	.54	1.00	.09	.17	48.93	55.68
40	450	424	.98	1.63	.15	.24	49.72	56.20
45	794	864	1.56	2.75	.26	.49	50.72	56.69
50	1,379	1,530	2.70	3.51	.45	.65	52.08	56.99
55	2,358	2,386	4.47	4.53	.77	.84	53.82	57.38
60	3,783	3,475	7.16	6.19	1.23	1.11	55.92	58.04
65	5,536	5,044	10.98	9.01	2.05	1.65	58.16	59.14
70	6,965	7,414	15.73	13.54	3.01	2.50	60.36	60.84
75	7,919	8,974	23.76	18.78	4.72	3.84	63.65	63.22
80	7,823	9,733	39.87	32.44	8.35	5.82	67.75	68.60
85	5,390	9,775	61.44	70.62	14.99	14.67	61.44	70.62
90	----------	----------	----------	----------	----------	----------	----------	----------

[1] Values for ages from birth to 5 years considered too unreliable to be useful.
[2] Number of new cases turned out to be negative. See text.

rates are shown in table 2. The rates in table 1 are of the nature of annual incidence rates.

Probability of Acquiring the Cardiovascular-renal Diseases

The method used in proceeding from the prevalence of "all recorded cases" to the number of new cases arising between one age and the

Table 2c. *Crude abridged life table showing how many out of 100,000 infants of each sex can be expected to acquire nephritis between specified birthdays; and certain other measures of nephritis incidence and mortality from the life table*

[See text for complete description]

Exact age x (1)	Prevalence of nephritis (per head) at exact age x (National Health Survey) (2)		Number still living at exact age x (1939-41 life table) (3)		Number living at exact age x who have nephritis (4)		Number acquiring nephritis between exact age x and $x+5$ (5)	
	Male	Female	Male	Female	Male	Female	Male	Female
0	0	0	100,000	100,000	0	0	(1)	(1)
5	.00165	.00235	93,624	94,848	154	223	180	75
10	.00230	.00250	93,054	94,402	214	236	65	2
15	.00200	.00211	92,508	94,000	185	198	45	73
20	.00186	.00250	91,617	93,293	170	233	95	203
25	.00224	.00400	90,385	92,322	202	369	147	203
30	.00290	.00505	89,009	91,182	258	460	228	247
35	.00400	.00605	87,371	89,810	349	543	316	346
40	.00520	.00733	85,246	88,092	443	646	381	369
45	.00598	.00782	82,336	85,856	492	671	594	546
50	.00742	.00893	78,254	82,828	581	740	930	957
55	.00997	.01208	72,627	78,708	724	951	1,327	1,270
60	.01340	.01485	65,142	73,093	873	1,085	1,950	1,735
65	.01950	.01800	55,776	65,523	1,088	1,179	2,724	2,350
70	.02865	.02212	44,588	55,449	1,277	1,227	3,086	3,231
75	.03570	.02865	31,864	42,425	1,138	1,215	3,178	3,768
80	.04230	.03150	18,995	27,524	803	867	2,991	3,961
85	.04880	.03258	8,693	13,972	424	455	2,598	4,142
90	----------	----------	2,787	5,044	154	168	----------	----------

Exact age x (1)	Number dying *with* nephritis between exact age x and $x+5$ (6)		Chances in 100 of acquiring nephritis between exact age x and $x+5$ (7)		Chances in 100 of acquiring nephritis between exact age x and $x+1$ (8)		Chances in 100 of ever acquiring nephritis after exact age x (9)	
	Male	Female	Male	Female	Male	Female	Male	Female
0	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
5	119	62	.19	.08	.04	.03	22.29	24.81
10	95	40	.07	.00	.03	(2)	22.25	24.85
15	62	38	.05	.08	(2)	.01	22.30	24.95
20	64	66	.10	.22	.02	.04	22.47	25.07
25	92	112	.16	.22	.03	.05	22.68	25.15
30	138	164	.26	.27	.04	.05	22.88	25.27
35	223	242	.36	.39	.07	.07	23.07	25.40
40	332	344	.45	.42	.08	.08	23.30	25.53
45	504	476	.73	.64	.12	.10	23.68	25.78
50	787	746	1.20	1.17	.20	.19	24.18	26.09
55	1,179	1,135	1.85	1.63	.32	.29	24.83	26.31
60	1,735	1,641	3.03	2.41	.52	.42	25.72	26.65
65	2,534	2,302	4.98	3.65	.86	.64	26.65	27.12
70	3,226	3,244	7.13	5.96	1.39	1.05	27.37	27.85
75	3,512	4,115	10.34	9.14	2.07	1.76	28.53	28.81
80	3,371	4,373	16.44	14.86	3.44	2.92	30.72	30.40
85	2,868	4,429	31.42	30.64	6.74	6.21	31.42	30.64
90	----------	----------	----------	----------	----------	----------	----------	----------

[1] Values for ages from birth to 5 years considered too unreliable to be useful.
[2] Number of new cases turned out to be negative. See text.

next permits the derivation of several auxiliary age curves of interest. In fact, the rates shown in table 1 are actually auxiliary, having been derived from the basic computations which are shown in abridged life-table form in table 2.

The concept is that of the life table. The progress of an initial cohort of 100,000 infants, all born alive at exactly the same moment, is followed through life. In the ordinary life table, death is the only event considered, and the table is designed to show the ages at which the members of the cohort would die if prevailing rates of mortality at each age continued to operate without change throughout their lifetime. The number surviving to their xth birthday is assigned the symbol l_x. In this study, the age at which the members of the cohort might be expected to acquire heart disease (or whichever of the three disease groups is under consideration) is also considered. Survivors at the xth birthday are divided into two categories: (1) those who have already become afflicted with heart disease[5] (l'_x); and (2) those who have not ($l_x-l'_x$). By the time of the $x+1$st birthday of the cohort, there has been a change in the number who have acquired the disease. This change occurring between the xth and $x+1$st birthdays can be expressed by the following simple relationship:

$$l'_{x+1}=l'_x+i_x-d'_x$$

in which l'_{x+1} is the number of persons with heart disease surviving to the $x+1$st birthday, i_x is the number of members of the cohort acquiring heart disease in the interval, and d'_x is the number of members of the cohort who died *with* heart disease (not necessarily *from* heart disease) in the interval. This last symbol includes deaths among the l'_x group and also a few among the i_x group. Note that if any persons recovered spontaneously from the disease it would be necessary to have another symbol, representing recoveries, on the right-hand side of the equation with a minus sign in front of it. The essence of the method used by Spiegelman and Marks (*2*) and adapted for use here is that the l'_x values are estimated by applying prevalence rates from the National Health Survey to the figures in the l_x column of the appropriate life table, the d'_x values are estimated from whatever data are available, and then the equation shown above is solved for i_x.[6]

The explanation of the columns in table 2a is as follows (tables 2b and 2c were prepared in an identical manner):

Column 1: This is the xth anniversary of the birth of the cohort of 100,000 individuals. It is shown only at intervals of 5 years to shorten the table.

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[5] The discussion throughout is for heart disease but is equally applicable if some other disease satisfying the assumptions discussed above is substituted, in particular, hypertension or nephritis.

[6] The process is actually slightly more complicated than this because the d'_x's cannot be estimated directly. See appendix.

Column 2: This is the value of the prevalence of heart disease from the National Health Survey, interpolated for the exact age shown in column 1 and expressed on a per person basis.

Column 3: This is the number out of 100,000 born simultaneously who would survive to the age in column 1 under the conditions of mortality existing in the years 1939–41.

Column 4: This is the product of the figures in columns 2 and 3 and represents the number surviving to this age with heart disease.

Column 5: This is the estimated number acquiring heart disease between the xth and $x+5$th birthday.

Column 6: This is the estimated number dying *with* heart disease between the xth and $x+5$th birthday. Note that the figure in column 4 plus that in column 5 minus that in column 6 gives the figure in column 4 for the next line down. (Slight differences are due to rounding-off.)

Column 7: This represents the probability (expressed as a percentage) of acquiring heart disease between the xth and $x+5$th birthday and is obtained by dividing the figure in column 5 by column 3 less column 4.

Column 8: A more useful figure but not derivable from other figures shown in this abridged table, this is the probability (expressed as a percentage) of acquiring heart disease between the xth and $x+1$st birthday. When multiplied by 1,000 this may be compared with the annual incidence rates shown in table 1. The figures in column 7 and column 8 differ from those in table 1 in that these are probability type rates.

Column 9: This shows the probability that a person who has reached age x without acquiring heart disease will ever acquire the disease. It is obtained by adding together all the new cases (in column 5) from age x to the end of life and dividing by the number who reached age x without acquiring heart disease (column 3 minus column 4) and multiplying by 100.

As an example of the way tables 2a, 2b, and 2c can be used, suppose it were necessary to estimate roughly how many out of a group of 1,000 males, all aged 20, or very close to that age, and free of heart disease, would acquire heart disease within the next 20 years. Table 2a shows that of the original cohort of 100,000 males there are 91,617 alive at their 20th birthday. Of these approximately 495 already have heart disease and 91,122 are still free of the disease. A total of 2,086 acquires it between age 20 and age 40; hence, the answer to the question proposed is that about 23 of the 1,000 males would acquire heart disease. From another function, not shown in table 2a but also required in the process of computing the tables, it is possible to estimate very roughly the proportion of persons at age x with heart disease who will survive to any given age beyond age x. Thus, one could determine in the example stated above not only that 23 of the 1,000 20-year-old males would acquire heart disease within 20 years but also the approximate number of those 23 who would survive to their 40th birthday.

In all three of the tables 2a, 2b, and 2c, the computations have been shown for more of the younger ages than is, perhaps, justified, considering the unreliability of the data and the lack of correspondence with the assumptions. This is demonstrated by the appearance of footnoted values in the tables for hypertension and nephritis indicating that the number of new cases turned out to be negative. However, in answering the type of questions presented in the example, such aberrations do not affect the estimate very greatly.

The 9th column of the tables can be used to estimate how many of the males and how many of the females now living in the population will acquire heart disease, hypertension, or nephritis in their lifetime. In the case of diabetes, Spiegelman and Marks speak of this as the "potentially diabetic population" (*2*).

It may seem curious that these functions in column 9, representing the chances of ever acquiring the disease, should increase gradually from childhood until the end of life or at least until very late in life. But it is a fact that in childhood and the young adult ages there is a fairly great chance of dying of some noncardiovascular-renal cause which takes its toll at the younger ages; thus, there is a substantial chance that younger persons will not reach the ages at which the rate of onset of the cardiovascular-renal diseases is very high. The person who has reached age 60, however, has, as it were, put many of the other risks behind him. The tables indicate that a child reaching his 5th birthday stands a 59-out-of-100 chance of being diagnosed sometime during life as having heart disease if a boy, a 62-out-of-100 chance if a girl. The corresponding figures for hypertension are 46 out of 100 for a boy and 53 out of 100 for a girl; and for nephritis they are 22 out of 100 for a boy and 25 out of 100 for a girl. The fact that the girl's chances are greater in each case is due to her greater average future lifetime. It should not be thought, however, that these represent the risks of experiencing a long, lingering illness of one or the other of these types. Some of the cases included represent conditions found only during physical examination which never cause more than minor disability, and some are conditions whose onset precedes death by only 24 hours or less, as in the case of cerebral hemorrhage or coronary occlusion. On the other hand, it should be remembered that these statistics, based on household surveys and including only conditions of which the person himself or his family are aware, are probably minimum estimates. Thorough physical examination of those not reporting these conditions might reveal many more who, in fact, had them. However, the more detailed the examination, the more abnormalities that will be found. The great majority of those included as having a cardiovascular-renal disease in the National Health Survey were persons who had had symptoms severe enough to cause them, at one time or another in the past, to seek medical advice.

Summary

In this, the sixth in a series of reports on the statistics of heart and other cardiovascular-renal diseases, data on prevalence from the

National Health Survey are used to estimate the age at onset of cases of these diseases. The prevalence rates by age are multiplied by the numbers of persons surviving to each age, taken from appropriate life tables. The results are assumed to represent the numbers of persons in the life table cohort who, having the disease, are still alive at a given age. These figures, together with estimates of the numbers of deaths among heart-disease patients at each age, are employed to compute approximate probabilities of acquiring the disease between one age and the next. The results may be used to make rough predictions, for example, of the proportion of persons alive at any given birthday who will acquire heart disease, hypertension, or nephritis before any other given birthday. Data are shown specific for sex and for each of the three major subdivisions of the cardiovascular-renal disease group. Particular attention should be paid to the definition of these subdivisions and the assumptions involved in the procedure before making use of the statistics.

ACKNOWLEDGMENT

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APPENDIX

Procedure in the Construction of the Rough Life Table to Show Incidence of Heart Disease in a Cohort of 100,000 Persons

1. The male prevalence rates for heart disease from the National Health Survey were plotted on an arithmetic grid in 5-year age groups through 84 years of age and for 85 years and over. Each age group was plotted as if the age were one year less than recorded in the survey, since the rates plotted were considered to represent prevalence at the beginning of the study year (year prior to visit). The age group was centered on the half-year because ages were recorded as of the last birthday. Hence, the 10- to 14-year group was actually plotted at age 11.5 years.

Through the points plotted as described, a smooth curve was passed with the aid of a set of French curves. The ordinate of this curve was then read off for each birthday from 1 to 90 years. These values, which were designated as r_x, were posted in the first column of a worktable having single years of age in the stub.

2. In the second column of this worktable the l_x values of the life table for total males (♂) were posted by single years from 0 to 90.

3. The product of the first two columns was computed and the values entered in the third column of the table. This column was labeled l'_x.

4. The purpose of the next step was to obtain an age-specific death rate, from all causes, among persons with heart disease. The deaths among heart cases, as reported in the National Health Survey, were considered to be underenumerated. The following adjustments were made to correct for this:

(a) The total male deaths (all causes) in the National Health Survey by age (5-year groups) were posted on another worksheet. From these deaths were subtracted all National Health Survey male deaths in which heart disease was the sole, primary, or contributory cause. The results were posted. These remaining deaths were then multiplied by the male age-specific prevalence rates for nondisabling heart cases in the National Health Survey, the assumption being made that among the persons whose deaths were apparently not associated with heart disease there were in fact as many nondisabling heart disease cases as in the living population at those ages. (The nondisabling prevalence rate was used, since it seemed likely that the heart cases that missed being mentioned in the report of death would be only those of the nondisabling type.) The numbers of deaths obtained by this multiplication were added to the total number of male deaths among heart disease patients as reported in the National Health Survey. Age-specific death rates per 1,000 male patients with heart disease were then computed.

(b) It was further known that all deaths in the survey in which heart disease was involved were underenumerated, as were the deaths from other causes also in the National Health Survey, because of the dissolving of families that often takes place upon the death of one member. Therefore, the ratio of the United States heart disease death rate for 1936 to the sole and primary heart disease death rate in the survey was computed for males at each age. These age-specific ratios were then multiplied by the corresponding age-specific death rates among male patients with heart disease as obtained in 4 (a).

(c) Since no attempt was made in the National Health Survey to cover the sickness experience of persons in resident institutions, a correction based upon the ratio of total heart disease death rates in the United States to total survey heart disease rates was considered to be too great. Consequently, a further adjustment was made, reducing the death rates among heart disease patients obtained in 4 (b) by the proportion of all United States heart disease deaths at each age occurring outside of resident institutions. This adjustment was made in order that the statistics on mortality among heart disease patients might be more comparable to those on prevalence of heart disease, which, owing to the nature of the survey, were restricted to prevalence for persons outside of resident institutions.

The year 1945 was the only year for which tabulations of deaths by age, inside and outside of resident institutions, were available. Therefore, data for this year were used to make the above adjustment.

The rates adjusted thus were then finally adopted as the male, age-specific death rates among heart disease patients outside of resident institutions.

5. The adjusted rates of 4 (c) were then plotted on arithmetic paper. The same centering points were used as in step 1. A smooth curve passing through the points was drawn. The values were read off for each birthday from 1 to 90 years and posted in the fourth column of the table mentioned in steps 1, 2, and 3. This was called the q'_x column.

6. The following formula was used to obtain i_x values:

$$i_x = \frac{l'_x q'_x + (l'_{x+1} - l'_x)}{1 - \frac{1}{2} q'_x}$$

The i_x values are the expected number of new cases of heart disease acquired by the cohort during a specified year of life. This formula makes use of the assumption that the persons acquiring heart disease between the xth and $x+1$st birthday were exposed to the risk of death characteristic of other persons with heart disease of that same age for an average of one-half year before reaching the $x+1$st birthday.

7. The male L_x values of the 1939–41 life table were posted. An incidence rate of heart disease among males outside of resident institutions was obtained by dividing the total of the i_x values in each 5-year age group by the corresponding total of the L_x values, the latter representing person-years lived by the cohort in the specified age interval.

8. Other steps in the computations for functions shown in table 2a have been explained in the text. The operations described in steps 1–7 are identical with those used for females with heart disease, and for males and females with hypertension and nephritis.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APRIL 8, 1950

For the current week in the Nation, reported cases of influenza continued to decline when compared with the preceding week, from 19,951 to 15,618. For the corresponding week last year 2,658 cases of influenza were reported. The cumulative total for the first 14 weeks of this year is 208,190 which may be compared with the corresponding total of 58,429 for the same period in 1949 and 242,601 for 1947, the highest during the last 5 years. The corresponding 5-year (1945–49) median is 124,010.

Of the 208,190 total cases of influenza reported in the United States this year, 4 States reported 157,187 as follows: Arkansas, 11,237; Virginia, 42,104; West Virginia, 11,907; and Texas, 91,939.

Cumulative figures for this calendar year exclude 43,536 delayed reports of influenza from Kentucky and 4,000 from Jones County, Iowa, which were estimated by special surveys.

The following States reported relatively large increases for the current week over the preceding week: Connecticut (4 to 24), Michigan (7 to 37), Minnesota (2 to 25), Nebraska (8 to 114), South Dakota (0 to 11), Maryland (67 to 175), and Utah (3 to 45).

A total of 63 cases of acute poliomyelitis was reported for the current week which includes 22 cases reported in Texas and 12 cases in California. Reported cases of meningococcal meningitis decreased from 118 cases last week to 109 for the current week but remained above the 5-year (1945–49) median of 87. Three cases of Rocky Mountain spotted fever were reported, two in Oregon and one in Oklahoma.

One case of anthrax was reported in New York, and one case of smallpox was reported in Missouri.

A typhoid fever outbreak in Anchorage, Alaska, was reported by telegraph, received April 13 from the Commissioner of Health. Twelve cases in children aged 5 to 10 years were reported and confirmed by laboratory test. This report is incomplete for Alaska and therefore is not shown on the table on the following page.

Telegraphic case reports from State health officers for the week ended April 8, 1950

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	------	------	37	59	------	25	------	------	6	------	------	------	31	------
New Hampshire	------	------	5	------	------	5	------	------	2	------	------	------	------	------
Vermont	------	------	------	1	------	------	------	------	2	------	------	------	23	------
Massachusetts	6	------	------	378	1	------	------	------	178	------	------	------	116	------
Rhode Island	1	------	2	7	------	7	------	------	4	------	------	------	11	------
Connecticut	1	------	24	19	1	54	------	------	32	------	------	1	98	------
MIDDLE ATLANTIC														
New York	6	------	[2] 18	261	9	355	3	------	[3] 50	------	------	1	154	10
New Jersey	------	------	4	809	3	75	2	------	34	------	------	------	89	------
Pennsylvania	1	------	------	456	4	105	------	------	121	------	------	3	128	1
EAST NORTH CENTRAL														
Ohio	6	------	15	323	7	107	2	------	191	------	------	2	162	12
Indiana	4	------	1	323	3	60	------	------	63	------	------	------	17	------
Illinois	------	1	3	386	8	104	1	------	76	------	1	------	63	4
Michigan	3	3	37	2,255	6	86	3	------	186	------	------	2	219	6
Wisconsin	------	------	329	527	20	27	1	------	90	------	------	1	151	------
WEST NORTH CENTRAL														
Minnesota	1	------	25	63	3	7	------	------	20	------	------	1	25	1
Iowa	------	------	1	469	2	2	3	------	4	------	------	------	16	15
Missouri	------	------	12	29	1	4	------	------	8	1	1	------	24	------
North Dakota	------	------	71	14	------	149	------	------	------	------	------	------	------	------
South Dakota	------	2	11	48	1	1	------	------	14	------	------	------	------	------
Nebraska	------	------	114	92	------	16	1	------	44	------	------	------	14	------
Kansas	2	------	3	35	------	8	1	------	13	------	------	------	33	1
SOUTH ATLANTIC														
Delaware	------	------		9	1	------	1	------	4	------	------	------	1	------
Maryland	6	------	175	21	2	53	------	------	30	------	------	------	34	------
District of Columbia	------	------	3	71	------	8	1	------	4	------	------	1	3	------
Virginia	2	------	2,993	81	10	134	------	------	21	------	------	------	48	1
West Virginia	3	------	847	301	1	12	------	------	9	------	------	2	61	5
North Carolina	5	------	------	158	------	------	------	------	17	------	1	1	25	------
South Carolina	6	------	220	107	------	4	------	------	1	------	------	------	2	6
Georgia	2	------	99	136	2	15	------	------	4	------	2	1	20	9
Florida	4	------	22	225	2	15	------	------	1	------	------	3	6	------

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended March 25, 1950.—Cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	New-foundland	Prince Edward Island	Nova Scotia	New Bruns-wick	Que-bec	On-tario	Mani-toba	Sas-katch-ewan	Al-berta	Brit-ish Co-lum-bia	Total
Chickenpox			12	10	285	190	26	36	48	117	724
Diphtheria					6	1		1			8
Dysentery:											
Amebic							1				1
Bacillary					2	4	4			1	11
Encephalitis, infectious						1					1
German measles			138		18	620		38	140	397	1,351
Influenza			20			578	3	2			603
Measles			7	473	609	389	15	29	18	251	1,791
Meningitis, meningococcal					2						2
Mumps	1		113	9	133	473	4	98	104	379	1,314
Poliomyelitis						1					1
Scarlet fever	4		10	5	65	37	5	3	71	5	205
Tuberculosis (all forms)	13		6	12	114	26	38	7	105	56	377
Typhoid and paratyphoid fever	1				3				1	2	7
Undulant fever					5	1	1		1	1	9
Venereal diseases:											
Gonorrhea	4	1	9	14	82	48	31	9	24	148	370
Syphilis	3	1	1	7	65	26	3	4	1	14	125
Whooping cough			10		120	39	3			59	231

CUBA

Habana—Notifiable diseases—4 weeks ended January 28, 1950.—Certain notifiable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox	9		Scarlet fever	1	
Diphtheria	10	1	Tuberculosis		1
Malaria	2		Typhoid fever	7	
Measles	1				

Provinces—Notifiable diseases—4 weeks ended January 28, 1950.—Notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana[1]	Matanzas	Santa Clara	Cama-guey	Oriente	Total
Cancer	3	16	11	24	1	20	75
Chickenpox		14		1	1		16
Diphtheria	1	15	1			1	18
Leprosy		4					4
Malaria	2	1			1	22	26
Measles		1		6	1		8
Poliomyelitis					1		1
Scarlet fever		1					1
Tuberculosis	2	17	4	13	3	11	50
Typhoid fever	2	10	4	9	2	20	47
Whooping cough		13	2				15
Yaws						1	1

---

[1] Includes the city of Habana.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

(Cases)

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January-February 1950	March 1950—week ended—			
		4	11	18	25
ASIA					
Burma			2	3	
Rangoon				1	
India	[1] 17,398	[2] 1,802	[2] 1,522	[2] 680	
Calcutta	956	135	199	253	312
Cocanada	2				
Cuddalore	17	3	5	1	
Madras	8	1	1	1	
Mangalore	(3)				
Masulipatam	45	1			
Negapatam	53	4	5	5	
Tellicherry	27				
Tuticorin	25				
Indochina		1	5		
Cambodia			5		
Cochinchina		1			
Rachgia		1			
Pakistan	[4] 2,052	4	4	6	11
Chittagong		4	4	6	11
Dacca	11				

[1] Includes imported cases. [2] Preliminary figures. [3] Report of 14 cases of cholera in Mangalore for the week ended Feb. 11, 1950 (see Public Health Reports for Mar. 31, 1950, p. 456) was in error. No report of cholera in Mangalore has been received so far this year. [4] For the month of January 1950 only.

PLAGUE

(Cases; P=present)

AFRICA					
Belgian Congo	3				
Costermansville Province	2				
Stanleyville Province	1				
Madagascar	24		[1] 2	[2] 2	
Union of South Africa	4				
Orange Free State	[3] 2				
ASIA					
Burma	55	2	2	4	
Bhamo	[4] 1				
Yenangyaung	10				
China:					
Chekiang Province	[5] 4				
Wenchow	[5] 4				
Kwangsi province	[5] 63				
Kwangtung Province	15				
India	15,461	[6] 2,079	[6] 393	[6] 865	
Indochina (French):					
Annam	17	3	4	5	1
Cambodia	4		5		
Laos	1	1			
Java	226	12	11	2	
Pakistan	[7] 1				
Thailand (Siam)	36	8	2	4	
SOUTH AMERICA					
Ecuador	4				
Loja Province	4				
Peru	2				
Piura Department	2				

[1] Mar. 1-10, 1950. [2] Mar. 11-20, 1950. [3] Suspected. [4] Imported. [5] Deaths. [6] Preliminary figures. [7] In Karachi, imported.

SMALLPOX

(Cases; P=present)

Place	January-February 1950	March 1950—week ended—			
		4	11	18	25
AFRICA					
Algeria	24		[1] 2		
Belgian Congo	352				
British East Africa:					
Nyasaland	134	23	12		
Tanganyika	27				
Cameroon (British)	217				
Cameroon (French)	12		[1] 3	[2] 2	
Dahomey	135	15	14		
Egypt	2				
Eritrea			1		
French Equatorial Africa	264				
French West Africa: Haute Volta	44		[1] 5	[2] 25	
Gambia		1	1	2	
Gold Coast	1				
Ivory Coast	148		[1] 131	[2] 26	
Libya	2				
Mauritania	1				
Morocco (French)			[1] 1		
Mozambique	51				
Nigeria	3,755	[3] 18	[3] 13	[3] 11	[3] 15
Niger Territory	336		[1] 43		
Rhodesia·					
Northern	1				
Southern	113				
Senegal	2				
Sierra Leone	2				
Sudan (Anglo-Egyptian)	20	3	1		3
Sudan (French)	39		[1] 5		
Togo (French)	23		[1] 5	[2] 4	
Union of South Africa	216	P	P	P	
ASIA					
Afghanistan	61				
Arabia	232	5	19	10	
Bahrein Islands: Bahrein	8				3
Burma	2,965	286	282	216	
China	298	12	25	30	19
India	24,291	3,937	3,034	2,021	[4] 612
Indochina (French)	181	5	23	11	11
Indonesia:					
Java	243	34	37	16	57
Sumatra	[5] 34		1	1	
Iran	77				
Iraq	48	4	6	5	9
Israel	15				
Japan	3			1	
Korea (Southern)	[6] 270				
Lebanon	[7] 1				
Pakistan	1,238	[4] 13	[8] 3	[4] 13	[4] 7
Palestine	[6] 63				
Syria	8	2	3		
Thailand (Siam)	420	6	7	8	
Transjordan	[6] 18			1	
Turkey (See Turkey in Europe).					
EUROPE					
Great Britain:					
Scotland: Glasgow					[8] 8
Turkey	5				
NORTH AMERICA					
Mexico	41		[9] 18		
SOUTH AMERICA					
Argentina	135	2	6	17	
Brazil	16	2			
Chile					(10)
Colombia	41	5			
Ecuador	100				
Venezuela	19				

---

[1] Mar. 1–10, 1950. [2] Mar. 11–20, 1950. [3] In Lagos only. [4] In ports only. [5] Includes suspected cases. [6] For the month of January 1950. [7] Imported. [8] Mar. 5–28, 1950. Includes 4 suspected cases. [9] In Mexico City, Feb. 26–Mar. 11, 1950. [10] Information dated March 31, 1950, reported an outbreak of a mild form of smallpox in the general area of Talca and Concepcion. One hundred thirty-three known cases had been reported.

TYPHUS FEVER*

(Cases; P=present)

Place	January-February 1950	March 1950—week ended—			
		4	11	18	25
AFRICA					
Algeria	35	—	[1] 5	—	—
Basutoland	16	4	—	—	—
Belgian Congo	11	—	—	—	—
Egypt	19	—	1	—	—
Eritrea	7	—	1	—	—
Ethiopia	23	—	—	—	—
Gold Coast	2	—	—	—	—
Libya	32	—	4	2	2
Madagascar	1	—	—	—	—
Morocco (French)	2	—	—	—	—
Morocco (International Zone)	1	—	—	—	—
Nigeria	1	—	—	—	—
Sudan (Anglo-Egyptian)	4	—	—	—	—
Tunisia	11	—	[1] 4	—	—
Union of South Africa	17	P	—	—	—
ASIA					
Afghanistan	67	—	—	—	—
Burma	7	—	1	—	—
China	[2] 4	—	1	—	—
India	5	—	—	—	—
Indochina (French)	1	1	—	2	1
Indonesia:					
Java	2	—	—	—	—
Sumatra	1	—	—	—	—
Iran	46	—	—	—	—
Iraq	[2] 14	6	4	1	7
Japan	495	[3] 39	[3] 28	[3] 10	—
Korea (Southern)	[2] 341	—	—	—	—
Pakistan	21	2	1	5	2
Straits Settlements	[2] 3	—	—	—	—
Syria	1	2	—	—	1
Transjordan	3	4	5	—	—
Turkey (See Turkey in Europe).					
EUROPE					
France	1	—	—	—	—
Germany (British Zone)	[2] 2	—	—	—	—
Germany (French Zone)	2	—	—	—	—
Germany (United States Zone)	1	—	—	—	—
Great Britain: Island of Malta	[4] 2	—	—	—	—
Greece	1	—	—	—	—
Hungary	1	—	—	—	—
Italy	15	—	—	—	—
Sicily	7	—	—	—	—
Poland	37	—	—	—	—
Spain	3	—	—	—	—
Turkey	64	13	5	3	6
Yugoslavia	34	15	—	—	—
NORTH AMERICA					
Costa Rica [4]	1	1	—	—	1
Guatemala [4]	4	—	—	—	—
Jamaica	3	—	—	—	—
Mexico [2]	23	—	4	2	—
Puerto Rico	2	—	—	—	—
SOUTH AMERICA					
Argentina	[4] 1	—	—	—	—
Chile	29	4	3	3	5
Colombia	57	12	—	—	—
Ecuador	[2] 33	1	1	—	—
Venezuela [4]	1	—	—	1	1
OCEANIA					
Australia	20	2	2	—	—

*Reports from some areas are probably murine type, while others include both murine and louse-borne types.

[1] Mar. 1–10, 1950. [2] Includes murine type. [3] In Tokyo and Yokohama. [4] Murine type.

YELLOW FEVER

(C=cases; D=deaths)

Place		January-February 1950	March 1950—week ended—			
			4	11	18	25
AFRICA						
French Equatorial Africa	C	1				
Port Gentil	C	[1] 1				
Gold Coast	C	5	1			1
Ankobra Ferry	D	1				
Bisiasi	D					[1] 1
Kade	C		1			
Oda Area:						
Akwatia	C	[1] 3				
Atiankama	C	1				
Sierra Leone	C	1				
Koinadugu District	C	1				
NORTH AMERICA						
Panama:						
Colon	D	1				
SOUTH AMERICA						
Bolivia:						
Chuquisaca Department	C	[2] 70			[3] 850	

[1] Suspected. [2] In Azero Province, with 15 deaths. [3] Reported in Azero Province during the period Jan. 1-Mar. 14, 1950, with 230 deaths.

Brucellosis Congress in Washington

The third Inter-American Congress on Brucellosis will be convened in Washington, D. C., November 6 to 10, 1950, by the Pan American Sanitary Bureau, Regional Office of the World Health Organization.

The first of the two previous congresses was held in Mexico in 1946 and the second, in Argentina in 1948. The Pan American Sanitary Bureau is sponsoring the congress in conjunction with the Inter-American Committee on Brucellosis and in cooperation with the Committee on Public Health Aspects of Brucellosis of the National Research Council.

The congress will discuss scientific works relating to brucellosis and exchange ideas on the techniques of combating this disease with the objectives of establishing uniform methods of diagnosis in accordance with the recommendations of the 12th Pan American Sanitary Conference (Caracas, 1947), and of considering measures for the treatment and control of the disease.

The topics for discussion at the congress come under five general headings: bacteriology; veterinary research; research on human brucellosis; epidemiology; and control.

Studies will be presented by specialists on the various aspects of brucellosis, a disease which constitutes a real threat to public health and is a serious medical and veterinary problem throughout the Americas.

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

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Biological Assay of Lots of Histoplasmin and the Selection of a New Working Lot

By LAWRENCE W. SHAW, A. M., ARDEN HOWELL, JR., PH. D.,
and EDWARD S. WEISS, M. S.*

Introduction

Since 1945, an ever-widening interest in the use of histoplasmin has resulted in the publication of many reports on its epidemiological, laboratory and clinical applications, and many other studies are in progress. The most extensive investigations have employed products from the following three sources: (1) Emmons at the National Institutes of Health—product H–3; (2) Christie and Petersen—the "Vanderbilt" product; (3) Howell of the Division of Tuberculosis—lots H–15 and H–40. In addition, the product distributed by Eli Lilly Company is currently in use and may well have extensive use in the future. Other histoplasmins have, of course, been made and used on a limited scale.

Although histoplasmin has been in use for more than 5 years, no standard or reference product exists with which new histoplasmins or the various products previously used can be compared. Valid interpretation of past work and assurance of reasonable comparability and continuity in future work would seem to require adequate comparisons of major lots already used. In addition, they should be compared with lots intended for use in the future. It is unfortunate that relatively little attention has been paid to this important aspect of work with histoplasmin. However, some contributions have been made by Smith (*37*), who compared H–3 and the Vanderbilt histo-

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plasmin, and by workers at the University of Chicago (*58*) who compared the Vanderbilt product with H–15.

The present paper provides some information on the comparability of some of the histoplasmins already extensively used. The principal purpose, however, is to present the assay of a new large batch of histoplasmin which the Division of Tuberculosis proposes to use in the immediate future for its own studies and those of its collaborators. It seems appropriate at this point to review briefly the work of the Division of Tuberculosis with regard to histoplasmin products used.

At the beginning of the work in 1945, a small amount of H–3 was provided by Dr. Emmons of the National Institutes of Health. Since a supply of this product was not available for very large-scale studies, several relatively small lots of histoplasmin were prepared by one of the authors (Howell) and later pooled to form a product designated as H–15. It was expected, when the use of H–15 was adopted in 1946, that enough had been prepared to last a number of years. By 1948, however, the supply had been so depleted that a new product was needed. Accordingly, another relatively small pooled lot, designated H–40, was prepared for interim use until a more adequate supply could be provided. After testing several proposed lots, a new product, designated H–42, has been prepared. It is expected that the amount now available will be sufficient for the next few years.

The introduction of a new lot of a biological product such as histoplasmin immediately raises the question of how it should be assayed. It was finally decided, on the basis of its principal use, to assay the new product by study of cutaneous reactions in human beings, and to attempt to find that dilution of the new product which would be of equal potency to the previously used 1:1000 dilution of H–15. A field program, planned for other purposes, provided an especially favorable opportunity to carry out this procedure in large groups of persons.

Experimental Procedure

For the sake of brevity and clarity in the following presentation, the 1:1000 dilution of H–15 is called "the standard."

The potency of each of several new lots of histoplasmin was assessed by testing three dilutions against the standard 1:1000 dilution of H–15. The dilutions used were chosen on the basis of preliminary trials with the expectation that the weakest dilution would be less potent and the strongest dilution more potent than the standard. Each dilution was compared with the standard by administering the test antigen in one arm, and at the same time, the standard in the other arm of each of a large number of persons.

A measure of the relative potency of each dilution of the test lot was established by utilizing the following two percentages:

1. The percentage of persons who developed smaller reactions to the particular dilution than to the standard;
2. The percentage of persons who developed greater reactions to the particular dilution than to the standard.

If the second percentage is greater than the first, the dilution is considered stronger than the standard; if the opposite occurs, the test dilution is considered weaker. The algebraic difference between these two percentages constitutes a sensitive index of potency and is called the *critical difference.*

If two successive dilutions of the same lot are associated with a reversal of the sign of the critical difference; i. e., from negative to positive, such dilutions bracket the desired matching dilution. This matching dilution is defined as that dilution which would yield a critical difference of zero; i. e., it would give reactions stronger than the standard as frequently as it would give reactions weaker than the standard. It is estimated graphically or by computation from the critical difference obtained at each of the three dilutions of the test product.

Two criteria were used for grading the lots under consideration. The first was one of an a priori biological judgment, namely, that lots requiring lower concentrations (fewer parts per thousand) to match the standard were preferable. The second criterion involved the examination of the frequency with which a matching dilution gave reactions of essentially the same size as the reactions to the standard. It was felt that lots having large values for this frequency represented good matches to the standard. Further, it was believed that a lot could be considered unacceptable if at the matching dilution the frequency of agreement with the standard was exceptionally low. Some notion of an appropriate minimum was obtained by performing trials of the standard against itself.

Test Procedure

The skin tests were performed in the routine manner of Mantoux tuberculin tests. A dose of 0.1 ml. was introduced into the volar surface of the forearm approximately 4 inches from the elbow. The tests were read at 72 hours, and the largest transverse diameter of the induration, or of the erythema in the absence of induration, was recorded in millimeters.

To avoid any bias which would occur if one arm gave stronger reactions than the other, the standard was alternated from right to left arm in succeeding individuals. *The person reading the tests did* *not know in which arm the standard had been given.* There was the further advantage that the comparison would not be biased by lighting conditions or other factors which might affect the readings of one arm as compared with the other. Furthermore, the duplicate testing referred to above, in which the standard material was injected in both arms, was interspersed throughout the testing of most of the new lots. Thus the reader did not know which persons had had such identical tests.

Simultaneously with the testing operations, the field staff assessed the clinical accuracy of the work with respect to cooperation of patients and adequacy of technical detail. If any tests were considered unsatisfactory, due record was made of this fact, and the results of such tests have been excluded. Less than 5 percent of nearly 13,000 paired tests were excluded from the analysis.

The comparative tests were performed in the course of tuberculin and histoplasmin surveys conducted in institutions operated by the Department of Welfare of the State of Ohio. For each institution the prevalence of sensitivity to H–15 is indicated in table 1 which also shows the lots tested at each place.

Table 1. *Histoplasmin sensitivity*[1] *and lots tested against H–15 at each institution*

Name of institution	Number tested	Percent reactors [2]	Lots tested against H–15
Columbus State School	1, 217	52. 2	H–38, H–15.
Columbus State Hospital	1, 269	62. 1	H–36, H–39, H–15.
Orient State School	1, 917	66. 0	H–37, H–40, H–15.
Columbus Penitentiary	1, 823	70. 0	H–41, H–42, H–15.
Dayton State Hospital	990	61. 9	H–41, H–42, H–15.
Cleveland State Hospital	1, 604	31. 4	H–43, H–44.
Cincinnati State Hospital	937	72. 0	H–38, H–41, H–42.
Delaware Girls' Industrial School	224	50. 9	Lilly (B–8287).
Marysville State Reformatory	310	50. 0	H–42.
Mansfield State Reformatory	1, 427	53. 5	Lilly, H–42, H–15.
Lancaster Boys' Industrial School	601	43. 8	H–42.
All institutions	12, 319	57. 2	

[1] To standard (1:1000 H–15).
[2] Reactor is person responding with 5 mm. or more of induration.

Materials

Each of the several lots of histoplasmin employed in this study was prepared by a method similar to that employed by Emmons et al. (*42*). The medium employed, incubation time, and strain of *Histoplasma capsulatum* for each lot are shown in table 2.

Lot H–15 histoplasmin was prepared in July 1946 by pooling portions of lots H–2, H–4, H–5, H–6, and H–7; lot H–40 was prepared in January 1948 by pooling portions of lots H–9, H–11, and H–13.

Table 2. *Media, incubation periods and strains of* Histoplasma capsulatum *used in the preparation of specified lots of histoplasmin*

Lot number	Date harvested	Medium	Incubation period (days)	Strain
H-2	February 1946	Long's synthetic with 1 percent bactodextrose.	[1] 201 [1] 155	American type culture collection No. 8136.
H-4	do	do	201	See De Monbreun, W. A. (*51*).
H-5	do	do	159	Portuondo, B. C.[2]
H-6	March 1946	B. A. 2[3]	128	See Rhodes, P. H. et al. (*52*).
H-7	do	B. A. 2	{[1] 138 [1] 113}	Peterson, J. C.[2]
H-9	do	do	[1] 141	See De Monbreun, W. A. (*51*).
H-11	April 1946	do	160	American type culture collection No. 8136.
H-13	do	do	140	See Reid, J. D. et al. (*54*).
H-36	August 1947	do	101	See Rhodes, P. H. et al. (*52*).
H-37	do	do	102	Emmons, C. W.[2]
H-38	do	do	103	Peterson, J. C.[2]
H-39	do	do	105	See De Monbreun, W. A. (*51*).

[1] In part.
[2] Personal communication.
[3] Synthetic medium employed by Emmons, C. W. et al. (*42*).

Results

Tests With Materials of Known Potency

Before the results obtained with the various lots tested are considered, the method of analysis will be illustrated by the consideration of results of tests of serial dilutions of the standard itself. It will be shown that the analytical procedure is quite successful in detecting twofold differences in dilution.

Tests were made with 0.5, 2 and 4 parts per 1,000 of H–15 against the 1:1000 dilution of the same material. Each trial dilution was tested on a separate group of persons. The detailed results for each comparison are presented in correlation tables employing certain arbitrary class intervals (table 3). The number in each cell represents the number of persons with a reaction to the standard dilution of the degree specified at the top of its column, and a reaction to the test dilution of the degree specified at the left side of its row.

Each detailed correlation table can be reduced to the three desired summary figures:

1. The sum of the figures above the diagonal represents the number of persons whose reactions to the test material were smaller than to the standard.

2. The sum of the figures below the diagonal represents the number of persons whose reactions to the test material were greater than to the standard.

3. The sum of the figures on the diagonal represents the number of persons whose reactions to the test material were essentially equal to their reactions to the standard. Persons who showed no reaction to either product are excluded from this sum, because they do not

Table 3. *Correlation between degree of response[1] to specified dilution of lot H–15 and to the standard 1:1000 dilution of the same product*

1:1000 H–15

0.5:1000 H–15	A	B	C	D	E	F	G	H	Total
A	31	--	1	2	1	1	--	--	36
B	--	--	--	--	--	--	--	--	--
C	1	--	3	3	--	3	--	--	10
D	--	--	--	8	14	6	1	--	29
E	1	--	5	7	14	18	4	--	49
F	--	--	--	4	7	3	1	1	16
G	--	--	--	--	3	2	5	1	11
H	--	--	--	--	--	1	2	--	3
Total	33	--	9	24	39	34	13	2	154

1:1000 H–15

2:1000 H–15	A	B	C	D	E	F	G	H	Total
A	67	--	--	--	--	--	--	--	67
B	--	1	--	--	--	--	--	--	1
C	2	2	1	1	--	--	--	--	6
D	--	--	1	1	--	--	--	--	2
E	--	--	4	2	5	7	--	--	18
F	2	--	--	3	17	26	5	--	53
G	--	--	--	--	2	15	9	2	28
H	--	--	--	--	--	5	4	3	12
Total	71	3	6	7	24	53	18	5	187

1:1000 H–15

4:1000 H–15	A	B	C	D	E	F	G	H	Total
A	51	1	--	--	--	--	--	--	52
B	2	--	--	1	--	--	1	--	4
C	--	1	--	--	--	--	--	--	1
D	4	1	--	4	2	1	--	--	12
E	3	--	2	5	9	3	--	--	22
F	1	--	--	11	11	4	--	1	28
G	--	1	1	4	21	12	3	2	44
H	--	--	--	1	4	7	4	--	16
Total	61	4	3	26	47	27	8	3	179

[1] A = No response.
B = Erythema only, less than 10 mm.
C = Either: erythema only, 10 mm. or more
or: induration of 1-4 mm.
D = Induration of 5-7 mm.
E = Induration of 8-9 mm.
F = Induration of 10-11 mm.
G = Induration of 12-14 mm.
H = Induration of 15 mm. or more.

Table entries represent number of persons.

contribute information about the potency of the two products. Their inclusion would make the degree of agreement dependent on the level of sensitivity in the group used for the tests.

For each of the three dilutions, these summary figures are presented in table 4. The numbers have been converted to percentages, and, for convenience in further discussion, the percentages which yield the critical difference will be called critical percentages.

Table 4. *Comparison of materials of known potency: tests of three dilutions of H–15 against the standard 1:1000 dilution of H–15*[1]

Response	Persons					
	0.5:1000 H–15		2:1000 H–15		4:1000 H–15	
	Number	Percent	Number	Percent	Number	Percent
Total tested	154	----------	187	----------	179	----------
No response to either dilution	31	----------	67	----------	51	----------
Some response to one or both dilutions	123	100.0	120	100.0	128	100.0
Reaction to the test dilution was:						
Smaller than to 1:1000 H–15	57	46.4	15	12.5	12	9.4
Greater than to 1:1000 H–15	33	26.8	59	49.2	96	75.0
Equal to 1:1000 H–15	33	26.8	46	38.3	20	15.6
Critical difference (greater-smaller)	----------	−19.6	----------	36.7	----------	65.6

[1] See table 3 for details. See appendix for details of tables 5–12.

In the group that received the 0.5:1000 dilution, 46.4 percent gave weaker reactions to this dilution than to the standard, while 26.8 percent gave stronger reactions. The negative critical difference, —19.6 percent, indicates that the 0.5:1000 dilution is weaker than the standard. With the 2:1000 dilution the relationship to the standard is completely inverted; the critical percentages are 12.5 percent and 49.2 percent, yielding a critical difference of 36.7 percent. With 4:1000 the difference in potency is further emphasized by a critical difference of 65.6 percent.

As previously stated, the values of the critical differences not only reveal the relative potencies of each particular dilution, but they may be used to provide estimates of the best dilution for matching the standard. Such an estimate can be made graphically as in figure 1. Here the critical differences for each dilution have been plotted against the logarithms of the dilutions.

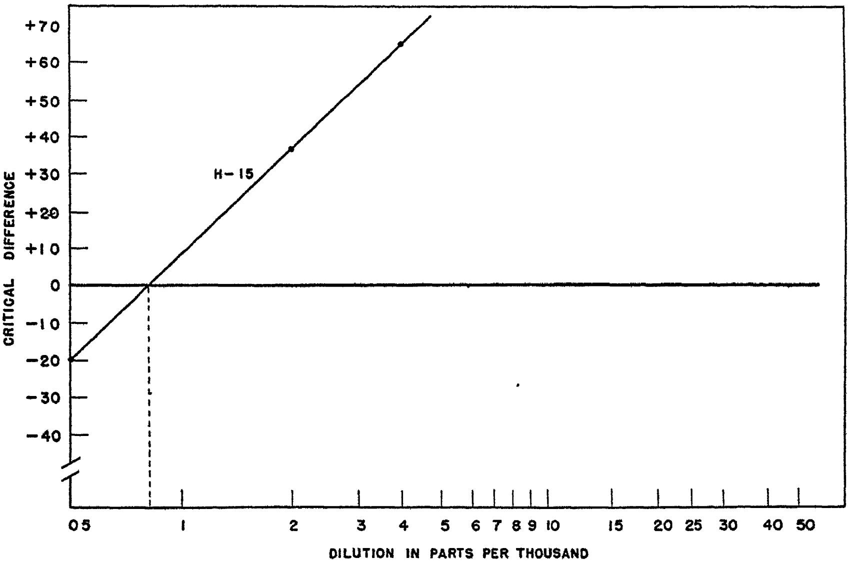

Figure 1. Assay of lot H–15 against itself. The indicated dilutions were tested against the standard 1:1000 preparation.

The relationship between the logarithm of the dilution and the critical difference seems to be linear over the range of dilutions employed in this set of comparisons. In fact, a straight line fits the points exceptionally well. The intersection of this line with the horizontal zero line provides the experimental estimate of the matching dilution, namely 0.8:1000. The deviation of this estimate from the known true matching dilution of 1:1000 is a function of both the statistical reliability of the critical percentages and the basic accuracy of the preparation of the dilutions. Although both of the weaker trial dilutions were prepared serially from the strongest (4:1000), the three bottles of standard dilution (1:1000) were individually prepared independently of the trial dilutions. These standard dilutions were prepared in the usual manner by adding 0.1 ml. of stock material to 100 cc. of buffer. It can be seen that a small error of 0.01 ml. would mean that the standard material was 0.9:1000 rather than the 1:1000 intended.

These remarks on the accuracy of the comparisons are made to indicate that, although twofold differences in dilutions can be readily detected, it is not claimed that the assay will estimate a matching dilution closer than within 25 percent of the true value.

Table 5. *Comparison of three dilutions of each of four lots of histoplasmin with 1:1000 H-15*

Response	Persons					
	Number	Percent	Number	Percent	Number	Percent
	1:1000 H-36		**3:1000 H-36**		**10:1000 H-36**	
Total tested	209		178		183	
No response to either product	35		45		38	
Some response to one or both products	174	100.0	133	100.0	145	100.0
Reaction to the test product was—						
Smaller than to 1:1000 H-15	151	86.8	63	47.4	32	22.1
Greater than to 1:1000 H-15	12	6.9	26	19.5	68	46.9
Equal to 1:1000 H-15	11	6.3	44	33.1	45	31.0
Critical difference (greater-smaller)		−79.9		−27.9		24.8
	1:1000 H-37		**5:1000 H-37**		**20:1000 H-37**	
Total tested	258		162		208	
No response to either product	41		53		61	
Some response to one or both products	217	100.0	109	100.0	147	100.0
Reaction to the test product was—						
Smaller than to 1:1000 H-15	208	95.9	83	76.2	63	42.8
Greater than to 1:1000 H-15	5	2.3	7	6.4	32	21.8
Equal to 1:1000 H-15	4	1.8	19	17.4	52	35.4
Critical difference (greater-smaller)		−93.6		−69.8		−21.0
	1:1000 H-38		**3:1000 H-38**		**10:1000 H-38**	
Total tested	386		275		425	
No response to either product	163		138		156	
Some response to one or both products	223	100.0	137	100.0	269	100.0
Reaction to the test product was—						
Smaller than to 1:1000 H-15	187	83.9	90	65.7	106	39.4
Greater than to 1:1000 H-15	13	5.8	11	8.0	48	17.8
Equal to 1:1000 H-15	23	10.3	36	26.3	115	42.8
Critical difference (greater-smaller)		−78.1		−57.7		−21.6
	1:1000 H-39		**5:1000 H-39**		**20:1000 H-39**	
Total tested	120		173		168	
No response to either product	29		44		28	
Some response to one or both products	91	100.0	129	100.0	140	100.0
Reaction to the test product was—						
Smaller than to 1:1000 H-15	65	71.4	50	38.8	18	12.9
Greater than to 1:1000 H-15	11	12.1	27	20.9	85	60.7
Equal to 1:1000 H-15	15	16.5	52	40.3	37	26.4
Critical difference (greater-smaller)		−59.3		−17.9		47.8

Assay of Each of Four Lots of Histoplasmin

Four large histoplasmin lots, identified as H–36, H–37, H–38, and H–39, were available. Preliminary trials indicated that they were all weaker than H–15, with H–37 and H–39 appearing especially weak. This information guided the selection of the trial dilutions shown in the summary table of results from tests with each of the four lots (table 5). The detailed correlation tables for each dilution of each lot are provided in the appendix. The critical difference for each lot at each dilution is plotted on figure 2. First approximations to the matching dilution for each lot are obtained by connecting the two points closest to the zero axis.

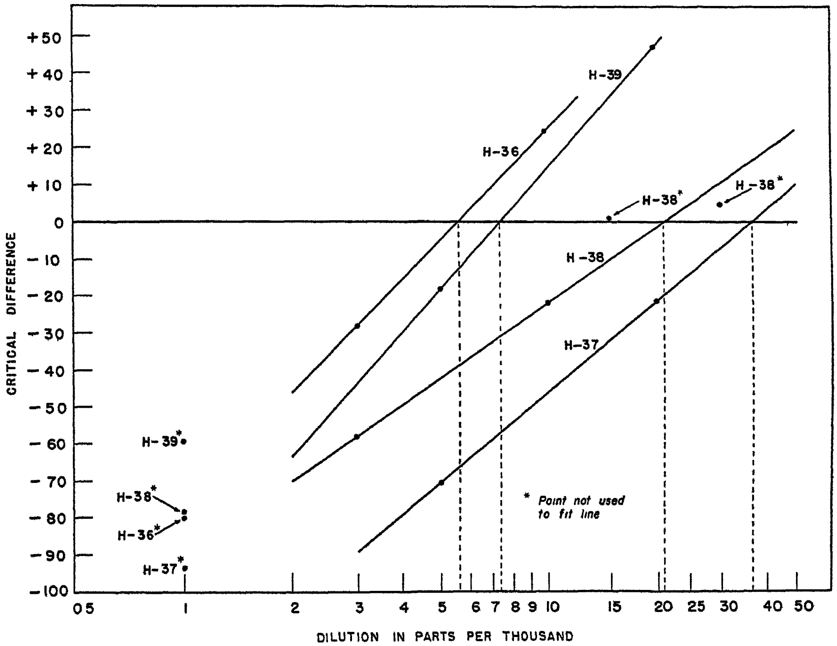

Figure 2. Assay of lots H–36, H–37, H–38, and H–39 against H–15. The indicated dilutions of each lot were tested against the standard 1:1000 dilution of H–15.

It appeared appropriate to reject lot H–37 from further consideration because of the high concentration required to match the standard, approximately 35 parts per 1000. H–38 might also have been rejected, but judgment was reserved pending further examination of the data and additional clinical testing.

The data were reviewed to see whether there was any marked variation in the degree of agreement with the standard at the matching dilution of each lot. For this purpose the diagonal sum; i. e., the percentage of persons with the same reaction to the two products, was examined. It was possible, of course, to do this only for the dilutions tested and not for the matching dilutions. It may reasonably be inferred, however, that the degree of agreement at the matching dilution would not be less than at any other dilution. Therefore, crude estimates were made from the values observed with the dilutions closest to matching. There was no great variation in the degree of agreement among the four lots, which in each case was very satisfactory when compared with the best that might be expected on the basis of the degree to which H–15 agreed with itself. (Data on the self-matching characteristics of H–15 are presented in a later section.) By this criterion H–38 was one of the better lots.

Subsequent tests of two additional dilutions of H–38, 15 and 30 parts per thousand, were performed. The results are shown in table 6 and the two critical differences are also plotted on figure 2. A straight line fitted (not shown) to the three points near the zero axis yielded an estimate of 24 parts per thousand for the matching dilution.

Table 6. *Comparison of two additional dilutions of H–38 with 1:1000 H–15*

Response	Persons			
	15:1000 H–38		**30:1000 H–38**	
	Number	Percent	Number	Percent
Total tested	90		289	
No response to either product	22		48	
Some response to one or both products	68	100.0	241	100.0
Reaction to the test product was—				
Smaller than to 1:1000 H–15	19	28.0	53	22.0
Greater than to 1:1000 H–15	20	29.4	63	26.1
Equal to 1:1000 H–15	29	42.6	125	51.9
Critical difference (greater-smaller)		1.4		4.1

Assay of Four Pooled Lots

Since no individual lot appeared to warrant selection it was decided to form a pooled lot. To determine whether the inclusion of H–38 was advisable, pools including and excluding this lot were necessary. Although pooling in equal parts was the natural approach, it was apparent that pooling in proportion to the available supply of each lot would provide a larger volume of the final product.

The requirements of including and excluding H–38 from the pool and of using equal and proportionate volumes of the constituents resulted in the preparation of four separate specimen pools for comparative evaluation. Their designations and composition were:

	H–41	*H–42*	*H–43*	*H–44*
H–36	1	2	1	2
H–38	1	2	--	--
H–39	1	1	1	1

The extensive information on the component lots permitted the selection of trial dilutions for the pooled lots in a narrow range. The results of comparing each of the four pooled lots against 1:1000 H-15 are shown in table 7 and figures 3, 4, and 5. (Detailed tables are in the appendix.)

The tests with both H-41 and H-42 yielded 8:1000 as the estimate for the matching dilution. The degrees of agreement with the stand-

Table 7. *Comparison of specified dilutions of each of four lots of histoplasmin with 1:1000 H-15*

Response	Persons							
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
	4:1000 H-41		**8 :1000 H-41**		**8 :1000 H-41**		**16:1000 H-41**	
Total tested	418	....	419	....	268	....	188	....
No response to either product	114	....	115	....	79	....	42	....
Some response to one or both products	304	100.0	304	100.0	189	100.0	146	100.0
Reaction to the test product was—								
Smaller than to 1:1000 H-15	152	50.0	102	33.6	72	38.1	24	16.4
Greater than to 1:1000 H-15	55	18.1	102	33.6	55	29.1	76	52.1
Equal to 1:1000 H-15	97	31.9	100	32.8	62	32.8	46	31.5
Critical difference (greater-smaller)	......	−31.9	......	0	......	−9.0	......	35.7
	4:1000 H-42		**8:1000 H-42**		**8:1000 H-42**		**16:1000 H-42**	
Total tested	428	....	254	....	450	....	251	....
No response to either product	131	....	69	....	116	....	50	....
Some response to one or both products	297	100.0	185	100.0	334	100.0	201	100.0
Reaction to the test product was—								
Smaller than to 1:1000 H-15	138	46.5	80	43.2	82	24.6	35	17.4
Greater than to 1:1000 H-15	40	13.5	48	26.0	77	23.0	119	59.2
Equal to 1:1000 H-15	119	40.0	57	30.8	175	52.4	47	23.4
Critical difference (greater-smaller)	......	−33.0	......	−17.2	......	−1.6	......	41.8
	4 :1000 H-43		**8:1000 H-43**					
Total tested	224	....	530	....				
No response to either product	140	....	325	....				
Some response to one or both products	84	100.0	205	100.0				
Reaction to the test product was—								
Smaller than to 1:1000 H-15	53	63.1	67	32.7				
Greater than 1:1000 H-15	12	14.3	62	30.2				
Equal to 1:1000 H-15	19	22.6	76	37.1				
Critical difference (greater-smaller)	......	−48.8	......	−2.5				
	4:1000 H-44		**6:1000 H-44**		**8:1000 H-44**			
Total tested	277	....	278	....	295	....		
No response to either product	172	....	204	....	186	....		
Some response to one or both products	105	100.0	74	100.0	109	100.0		
Reaction to the test product was—								
Smaller than to 1:1000 H-15	56	53.3	23	31.1	17	15.6		
Greater than to 1:1000 H-15	19	18.1	27	36.5	44	40.4		
Equal to 1:1000 H-15	30	28.6	24	32.4	48	44.0		
Critical difference (greater-smaller)	......	−35.2	......	5.4	......	24.8		

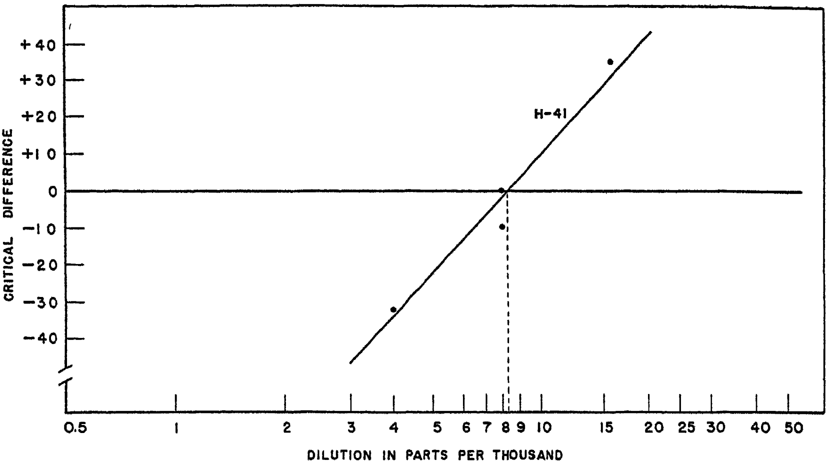

Figure 3. Assay of lot H–41 against H–15. The indicated dilutions were tested against the standard 1:1000 dilution of H–15.

ard at the matching dilution were 33 percent in both trials with H–41 and 52 percent and 31 percent for the two trials with H–42. Thus the evidence somewhat favored H–42 which, in view of its larger size, would have been chosen unless the data had been clearly in favor of H–41.

The tests with H–43, the pool of equal parts of H–36 and H–39 also indicated a matching dilution of 8:1000 (a smaller figure was expected). The agreement with the standard at this dilution was 37 percent. The matching dilution for H–44, the other lot not involving H–38, was 6:1000, and the degree of agreement was 32 percent. Thus there was no apparent superiority of H–43 or H–44 over H–42, and

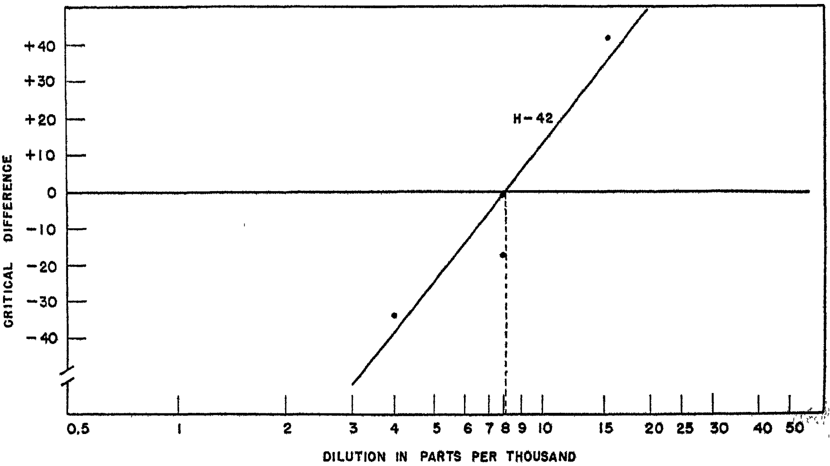

Figure 4. Assay of lot H–42 against H–15. The indicated dilutions were tested against the standard 1:1000 dilution of H–15.

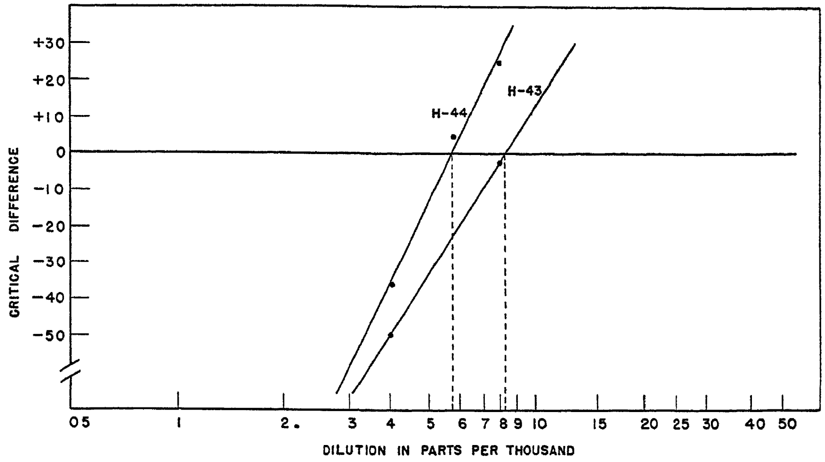

Figure 5. Assay of lots H–43 and H–44 against H–15. The indicated dilutions of each lot were tested against the standard 1:1000 dilution of H–15.

an 8:1000 dilution of H–42 was tentatively selected as the new working lot of histoplasmin for the research activities of the Division of Tuberculosis.

Since the estimated matching dilution of H–42, 8:1000, was close to the more easily prepared 1:100 dilution (10:1000), it was believed of interest to try out this dilution to see if it gave results differing in any great extent from the 8:1000 dilution.

In the first trial, group 1 of table 8, an unexpected result occurred. The critical difference was significantly negative, —29.9 indicating that the dilution was weaker than the standard. Examination of records and procedures did not explain this result. There was, however, an indication that something irregular had happened, since similar tests on 10:1000 H–41 performed at the same institution showed this dilution of H–41 to be weaker than the standard, a

Table 8. *Comparisons of 10:1000 dilution of H–42 with 1:1000 H–15 in 4 groups of persons*

Response	Persons							
	Group I		Group II		Group III		Group IV	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total tested	272	------	310	------	321	------	601	------
No response to either product	58	------	141	------	132	------	327	------
Some response to one or both products	214	100.0	169	100.0	189	100.0	274	100.0
Reaction to the test product was:								
Smaller than to 1:1000 H–15	102	47.7	42	24.9	46	24.3	22	8.0
Greater than to 1:100 H–15	38	17.8	57	33.7	61	32.3	174	63.5
Equal to 1:100 H–15	74	34.5	70	41.4	82	43.4	78	28.5
Critical difference (greater-smaller)	------	—29.9	------	8.8	------	8.0	------	55.5

result also contrary to expectation. It was concluded that some error had occurred and further tests with 10:1000 H–42 were warranted.

These were conducted in the fall of 1949 at three different institutions. At the first two, the results were consistent with expectation. The critical differences were moderately positive, 8.8 percent and 8.0 percent. At the third, the results were again inconsistent with past experience. The critical difference was 55.5 percent. Review of the detailed correlation table revealed that the differences between the reactions to the two products tended to be quite small. It is probably relevant that this was the only place where the standard procedure of alternating the placement of the standard product in the right and left arms was not followed. It was concluded that the large critical difference resulted from a small error in preparation of materials augmented by a reading bias.

It appeared then that the 1:100 dilution of H–42 was a very close match to the former standard, 1:1000 H–15. It was decided, nevertheless, to adopt 8:1000 H–42 as the new standard, and to provide the convenience of the 1:100 dilution procedure by preparing batches of H–42 so that a 1:100 dilution of such stock would yield the 8:1000 dilution used in these studies. This is achieved by adding 25 percent buffer solution to the pooled material when it is prepared.

Duplicate Tests With 1:1000 H–15

As indicated previously, duplicate tests of the standard were made; i. e., 1:1000 H–15 was injected in both arms of a number of persons at several institutions. These tests provided an estimate of the degree to which a new product might be expected to match the standard, by showing how well the standard could match itself. Each of the comparisons represents duplicate tests from the same bottle of diluted antigen. These duplicate tests also provided extensive information on the relative response of right and left arms.

The results of three sets of duplicate tests, shown in table 9, indicate that the standard agreed with itself, within the limits of the class intervals used, in 42.9 percent, 33.2 percent, and 32.2 percent, respectively, of the reactions observed. As previously indicated these values are not higher than those obtained with the new products.

The comparison of right arm with left arm indicated a very slight predominance of reactions in the left arm. The critical differences for left arm against right arm were 7.7 percent, 2.6 percent, and 7.0 percent, respectively, in the three trials. Additional tests of this kind with H–41, H–42, and 0.0002 mg. PPD indicated that the opposite occurred frequently. Thus it appeared that responses in the two arms could be considered to be essentially the same in the long run.

To ascertain whether different stock bottles of H–15 might have

Table 9. *Comparison of the relative responses in the left and right arms in duplicate tests with 1:1000 H–15*

Response	Persons					
	Group I		**Group II**		**Group III**	
	Number	Percent	Number	Percent	Number	Percent
Total tested	268		238		331	
No response in either arm	86		45		104	
Some response in either or both arms	182	100.0	193	100.0	227	100.0
Left smaller than right	45	24.7	62	32.1	69	30.4
Left greater than right	59	32.4	67	34.7	85	37.4
Left equal to right	78	42.9	64	33.2	73	32.2
Critical difference (greater-smaller)		7.7		2.6		7.0

contributed to the erratic results observed in the trials with 10:1000 H–42, a direct comparison of two bottles of stock was made. This comparison also provided an estimate for the broader variation that might be expected in the preparation of supposedly identical products, in that bottle differences and variation in the preparation of dilutions would have a chance to exhibit themselves. Table 10 indicates that there was no essential difference between the bottles, for the critical difference was only −2.2 percent. The degree of agreement between the stock bottles, 36.4 percent, was just as good as that obtained with duplicate tests from the same bottle of diluted antigen.

Table 10. *Comparison of the relative potency of two stock bottles of H–15, diluted 1:1000*

Response	Persons	
	Number	Percent
Total tested	405	
No response to either preparation	177	
Some response to one or both preparations	228	100.0
Reaction to the preparation from bottle No. 2 was—		
Smaller than to bottle No. 1	75	32.9
Greater than to bottle No. 1	70	30.7
Equal to bottle No. 1	83	36.4
Critical difference (greater-smaller)		−2.2

Assay of Lot H–40

Since considerable quantities of lot H–40 have been used pending the selection of H–42, it is appropriate to report the results of tests with this antigen. Preliminary trials indicated that H–40 differed less in potency from H–15 than did the other lots. Therefore trial dilutions closer to 1:1000 were selected. Although three dilutions were employed, most of the comparative tests with one of them, 2:1000, were declared unreliable by the field staff, and therefore the entire set has been excluded from consideration in this assay. The results of tests with the other two dilutions are shown in table 11 and figure 6. The observed critical differences lead to an estimate of

Table 11. *Comparison of two dilutions of H–40 with 1:1000 H–15*

Response	Persons			
	1:1000 H–40		**5:1000 H–40**	
	Number	Percent	Number	Percent
Total tested	206		232	
No response to either product	70		48	
Some response to one or both products	136	100.0	184	100.0
Reaction to the test product was—				
Smaller than to 1:1000 H–15	83	61.0	35	19.0
Greater than to 1:1000 H–15	17	12.5	80	43.5
Equal to 1:1000 H–15	36	26.5	69	37.5
Critical difference (greater-smaller)		–48.5		24.5

3:1000 for the matching dilution. Before the refined technique employing critical differences to find the matching dilution was developed, tentative selection of a 2:1000 dilution was made. This dilution has been employed in a number of studies as well as the 1:1000 dilution.

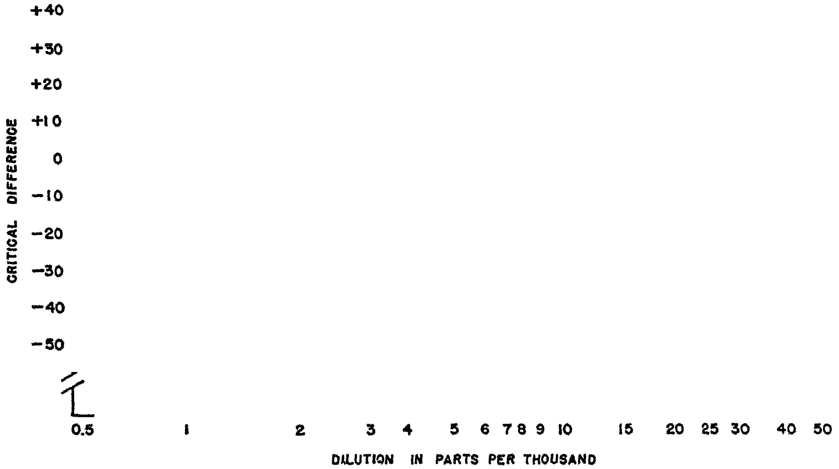

Figure 6. Assay of lot H–40 against H–15. The indicated dilutions were tested against the standard 1:1000 dilution of H–15.

In order to interpret the results of research programs in which H–40 was used, it is desirable to know how much weaker the dilutions employed were than the standard in terms of frequency of reactors. Direct answer to such inquiry may be obtained for the 1:1000 dilution by reference to the detailed results in the appendix. Unfortunately, no data can be presented for the 2:1000 dilution. From the appendix table for 1:1000 H–40 the following summary table may be constructed:

		1:1000 H-15		
		Nonreactors	*Reactors*[1]	*Total*
1:1000 H-40	Nonreactors	72	9	81
	Reactors[1]	1	124	125
	Total	73	133	206

[1] Persons with reactions of 5 mm. or more of induration.

From this table it may be seen that nine of the reactors to H-15 were nonreactors to H-40 while the opposite condition occurred only once. In terms of prevalence of sensitivity, 60.7 percent (125/206) were reactors to H-40, while H-15 elicited reactions in 64.6 percent (133/206). To summarize, 1:1000 H-40 produced 94 percent (125/133) as many reactors as did 1:1000 H-15 in the same group of 206 persons.

The comparisons are similar when a more liberal definition of a reactor is used, namely, a person with any induration, or erythema only of 10 or more mm. Specifically, 1:1000 H-40 was 96 percent efficient, detecting 128 reactors against 133 from 1:1000 H-15. On the other hand, it is interesting to observe that the difference in potency is more clearly manifested when the frequencies of large reactions are compared. For example, 1:1000 H-40 elicited only 9 reactions of 12 mm. or more of induration, while 1:1000 H-15 elicited 24.

Potency of Lilly Histoplasmin

As Smith has stated (*37*) there are now two major sources of histoplasmin, the Division of Tuberculosis and the Eli Lilly Company. A comparison of the Lilly product with H-15 was included in the course of this investigation.

Through the courtesy of Dr. C. G. Culbertson of the Lilly Laboratories, we received a small quantity of Lilly lot B-8287. There are two sets of directions accompanying this material, one for preparing a 1:100 dilution and another for 1:1000, with no indication of the dilution of choice. The results of testing both are shown in table 12,

Table 12. *Comparison of two dilutions of Lilly Lot B-8287 with 1:1000 H-15*

Response	Persons			
	1:1000 Lilly		1:100 Lilly	
	Number	Percent	Number	Percent
Total tested	224		701	
No response to either product	106		332	
Some response to one or both products	118	100.0	369	100.0
Reaction to the test product was—				
Smaller than to 1:1000 H-15	108	91.5	108	29.3
Greater than to 1:1000 H-15	4	3.4	86	23.3
Equal to 1:1000 H-15	6	5.1	175	47.4
Critical difference (greater-smaller)		−88.1		−6.0

with details in the appendix. The 1:1000 dilution of the Lilly material was much weaker than 1:1000 H–15, yielding a critical difference of −88.1 percent, whereas the 1:100 dilution of the Lilly product with a critical difference of −6.0 percent was just about equal to 1:1000 H–15.

Agreement on Selection of Reactors

It is of interest to examine the extent of agreement of the matching dilution with the standard in number and identity of reactors. For illustration this agreement for H–42 and for the Lilly product is shown in the following extract from the detailed correlation tables.

		1:1000 H–15	
		Nonreactors	*Reactors* [1]
8:1000 H–42	Nonreactors	208	21
	Reactors [1]	14	461
1:100 Lilly B–8287	Nonreactors	340	5
	Reactors [1]	3	353

[1] Reactors: Persons with induration of 5 mm. or more.

In the first group it may be seen that H–15 indicated 482 reactors (68.5 percent) while H–42 indicated 475 reactors (67.5 percent) in the same group of 704 persons. Thus the agreement on prevalence of reactors is excellent. Moreover, there was fairly good agreement between H–15 and H–42 on identity of reactors. The two products disagreed on 7 percent of the reactors to either product. Similar analysis of the tests with 1:1000 H–15 injected in both arms shows there was disagreement between the tests in 6 percent of the persons with a reaction in either arm.

The agreement between the Lilly product and H–15 was even better. The two values for prevalence are 50.8 and 51.1 percent, respectively. The two products in the matching dilutions disagreed on the identity of only 2.2 percent of the reactors.

Although agreement on reactor frequencies might be considered the ultimate objective for matched products, it should be noted that histoplasmin reactor frequencies are relatively insensitive to potency changes.

Summary

Early in 1948 the supply of histoplasmin (H–15) employed by the Division of Tuberculosis in most of its studies of histoplasmin sensitivity was nearly exhausted. This paper describes the procedures used in developing a large new lot of histoplasmin to replace H–15.

Histoplasmin lots, like most biological preparations, are known to differ in potency. Since there was no standard reference product, it was decided to achieve continuity in the research programs by adjusting the potency of the new material to match the old. This was done by determining what dilution of the new material would match the previously used 1:1000 dilution of H–15, arbitrarily called "the standard."

The estimation of the matching dilution followed the testing of three trial dilutions. Each trial dilution was compared to the standard by human skin testing in which the standard was placed in one arm and the trial dilution in the other. A sensitive measure of the relative potency of each trial dilution, called the critical difference, consisted of the difference of two percentages:

1. The percentage of persons whose reaction to the standard was larger;
2. The percentage of persons whose reaction to the trial dilution was the larger.

Critical differences for the three trial dilutions permitted estimation of a matching dilution associated with a zero critical difference, i. e., with equality of the two percentages.

Four lots of histoplasmin were considered in the selection of the new product. Tests of each lot and certain combinations of the lots led to the final selection of a pooled lot involving three of them. The estimated matching dilution for this pooled lot (H–42) was 8:1000.

Considerable use of a lot H–40 was made during the period of development of H–42. Comparison of this lot with H–15 indicates a matching dilution of approximately 3:1000. Estimates of the relative potency 1:1000 H–40 compared to the standard were made.

Tests of a lot of histoplasmin now being distributed by Eli Lilly Company revealed that a 1:100 dilution of this material (lot B–8287) was approximately equivalent to 1:1000 H–15.

Incidental to these assays, duplicate tests with the standard product were made to provide an estimate of the reproducibility of the histoplasmin skin test.

The analytical method employed (critical differences) appears to be fairly successful in achieving the objectives of the assay, namely, estimating the matching dilution for an unknown product.

Comparisons of the method with other techniques of assay are beyond the scope of this report, but it is planned to undertake such a comparison in an independent study.

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APPENDIX

Correlation between the degree of response[1] to the stated dilution of the test product and to the standard 1:1000 dilution of H–15

1:1000 H–15

1:1000 H–36	A	B	C	D	E	F	G	H	Total
A	35	8	10	22	12	7	--	--	94
B	--	--	--	4	1	1	--	--	6
C	--	1	3	15	12	1	3	--	35
D	1	1	2	5	10	15	5	--	39
E	--	--	2	--	1	6	4	1	14
F	--	--	--	2	1	1	5	8	17
G	--	--	--	2	--	--	1	1	4
H	--	--	--	--	--	--	--	--	--
Total	36	10	17	50	37	31	18	10	209

1:1000 H–15

1:1000 H–37	A	B	C	D	E	F	G	H	Total
A	41	2	5	23	41	23	5	1	141
B	--	--	--	--	1	--	--	--	1
C	1	--	--	2	5	9	6	--	23
D	1	--	--	2	10	17	21	4	55
E	--	--	--	--	1	7	16	3	27
F	--	--	--	1	2	--	5	2	10
G	--	--	--	--	--	--	1	--	1
H	--	--	--	--	--	--	--	--	--
Total	43	2	5	28	60	56	54	10	258

1:1000 H–15

3:1000 H–36	A	B	C	D	E	F	G	H	Total
A	45	1	4	2	3	1	--	--	56
B	1	5	3	--	--	1	--	--	10
C	2	3	2	3	1	3	--	--	14
D	--	1	2	3	5	3	--	--	14
E	--	--	--	3	4	11	9	1	28
F	--	1	--	1	6	9	8	1	26
G	--	--	--	--	2	2	13	3	20
H	--	--	--	--	--	--	2	8	10
Total	48	11	11	12	21	30	32	13	178

1:1000 H–15

5:1000 H–37	A	B	C	D	E	F	G	H	Total
A	53	--	9	8	4	2	3	--	79
B	--	--	--	--	--	--	--	--	--
C	--	--	2	8	4	3	--	1	18
D	--	--	--	10	12	12	4	--	38
E	--	--	--	4	4	2	7	--	17
F	--	--	--	--	2	2	1	1	6
G	--	--	--	--	--	1	1	2	4
H	--	--	--	--	--	--	--	--	
Total	53	--	11	30	26	22	16	4	162

1:1000 H–15

10:1000 H–36	A	B	C	D	E	F	G	H	Total
A	38	--	2	--	--	--	--	--	40
B	3	2	1	2	1	--	--	--	9
C	3	1	4	5	2	1	--	--	16
D	2	3	11	22	9	2	--	--	49
E	1	2	1	12	8	3	1	--	28
F	--	--	1	6	13	4	3	--	27
G	--	--	--	2	--	5	5	--	12
H	--	--	--	--	--	1	1	--	2
Total	47	8	20	49	33	16	10	--	183

1:1000 H–15

20:1000 H–37	A	B	C	D	E	F	G	H	Total
A	61	3	--	3	--	2	--	--	69
B	--	5	1	1	2	2	--	--	11
C	--	1	4	9	4	1	--	--	19
D	--	1	3	17	11	8	--	--	40
E	--	--	--	10	6	11	1	--	28
F	1	--	--	1	10	14	3	--	29
G	--	--	--	--	1	2	5	1	9
H	--	--	--	--	--	--	2	1	3
Total	62	10	8	41	34	40	11	2	208

1:1000 H–15

1:1000 H–40	A	B	C	D	E	F	G	H	Total
A	70	2	--	2	1	1	--	--	76
B	--	--	--	2	--	--	--	--	2
C	--	--	--	--	2	1	--	--	3
D	1	--	--	11	25	4	1	--	42
E	--	--	--	9	17	25	6	1	58
F	--	--	--	--	6	2	6	2	16
G	--	--	--	--	1	--	6	2	9
H	--	--	--	--	--	--	--	--	--
Total	71	2	--	24	52	33	19	5	206

1:1000 H–15

5:1000 H–40	A	B	C	D	E	F	G	H	Total
A	48	--	1	2	--	--	--	--	51
B	--	--	--	--	--	--	--	--	--
C	6	--	1	1	1	--	--	--	9
D	6	--	3	19	10	2	1	1	42
E	1	1	--	14	23	10	--	--	49
F	--	--	--	7	21	16	6	--	50
G	--	--	--	1	5	7	7	--	20
H	1	--	--	2	1	2	2	3	11
Total	62	1	5	46	61	37	16	4	232

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[1] A=No response.
B=Erythema only, less than 10 mm.
C=Either: erythema only, 10 mm. or more
or: induration of 1–4 mm.
D=Induration of 5–7 mm.
E=Induration of 8–9 mm.
F=Induration of 10–11 mm.
G=Induration of 12–14 mm.
H=Induration of 15 mm. or more

APPENDIX—Continued

Correlation between the degree of response[1] *to the stated dilution of the test product and to the standard 1:1000 dilution of H–15*—Continued

1:1000 H–15

1:1000 H–38	A	B	C	D	E	F	G	H	Total
A	163	1	9	19	10	7	2	--	211
B	--	1	--	1	--	--	--	--	2
C	3	--	7	11	15	19	4	2	61
D	1	--	--	6	2	25	20	4	58
E	--	--	1	2	2	13	9	4	31
F	--	--	--	2	3	1	6	2	14
G	--	--	--	--	--	1	1	2	4
H	--	--	--	--	--	--	--	5	5
Total	167	2	17	41	32	66	42	19	386

1:1000 H–15

1:1000 H–39	A	B	C	D	E	F	G	H	Total
A	29	4	2	4	7	9	--	--	55
B	1	--	--	--	1	1	--	--	3
C	5	--	4	4	1	--	--	1	15
D	1	--	--	5	2	3	3	--	14
E	--	--	--	--	3	4	5	1	13
F	--	--	--	--	1	1	4	3	9
G	--	--	--	--	1	--	2	6	9
H	--	--	--	--	--	1	1	--	2
Total	36	4	6	13	16	19	15	11	120

1:1000 H–15

3:1000 H–38	A	B	C	D	E	F	G	H	Total
A	138	5	4	3	2	--	--	--	152
B	3	2	--	1	--	1	--	--	7
C	4	--	1	4	1	--	--	--	10
D	--	--	--	1	15	8	1	--	25
E	--	--	1	--	7	15	10	1	34
F	--	--	--	--	2	5	12	2	21
G	--	--	--	--	--	--	9	5	14
H	--	--	--	--	--	--	1	11	12
Total	145	7	6	9	27	29	33	19	275

1:1000 H–15

5:1000 H–39	A	B	C	D	E	F	G	H	Total
A	44	5	1	--	1	--	--	--	51
B	3	11	3	--	1	--	--	--	18
C	2	1	2	4	--	--	--	--	9
D	--	1	5	17	9	3	2	--	37
E	--	--	--	5	4	7	3	--	19
F	--	--	1	2	5	7	8	--	23
G	--	--	--	--	1	--	10	3	14
H	--	--	--	--	--	--	1	1	2
Total	49	18	12	28	21	17	24	4	173

1:1000 H–15

10:1000 H–38	A	B	C	D	E	F	G	H	Total
A	156	3	2	--	--	--	--	--	161
B	1	4	--	--	1	1	--	--	7
C	1	1	4	2	5	5	--	--	18
D	--	--	1	7	5	10	2	--	25
E	--	1	2	6	7	21	2	1	40
F	--	--	--	--	7	31	35	5	78
G	--	--	--	--	1	17	14	6	38
H	--	--	--	--	2	1	7	48	58
Total	158	9	9	15	28	86	60	60	425

1:1000 H–15

20:1000 H–39	A	B	C	D	E	F	G	H	Total
A	28	1	--	--	--	--	--	--	29
B	3	5	--	1	--	--	--	--	9
C	1	1	7	--	--	--	--	--	9
D	4	--	9	8	6	3	--	--	30
E	1	1	6	11	5	5	--	--	29
F	--	--	4	13	15	6	2	--	40
G	--	--	--	3	5	5	5	--	18
H	--	--	--	--	1	1	1	1	4
Total	37	8	26	36	32	20	8	1	168

1:1000 H–15

15:1000 H–38	A	B	C	D	E	F	G	H	Total
A	22	--	--	1	--	--	--	--	23
B	1	--	--	--	--	--	--	--	1
C	--	--	2	1	1	--	--	--	4
D	--	--	1	7	3	2	--	--	13
E	1	--	--	1	3	2	1	--	8
F	--	--	--	--	7	8	6	--	21
G	--	--	--	--	1	5	5	2	13
H	--	--	--	--	--	--	3	4	7
Total	24	--	3	10	15	17	15	6	90

1:1000 H–15

30:1000 H–38	A	B	C	D	E	F	G	H	Total
A	48	--	1	1	--	--	--	--	50
B	--	3	--	--	--	--	--	--	3
C	2	--	13	1	1	--	--	--	17
D	1	--	2	27	5	3	--	--	38
E	--	1	--	4	22	8	5	--	40
F	--	--	--	5	9	35	22	1	72
G	--	--	--	1	3	25	15	5	49
H	--	--	--	--	--	2	8	10	20
Total	51	4	16	39	40	73	50	16	289

[1] A=No response.
B=Erythema only, less than 10 mm.
C=Either: erythema only, 10 mm. or more
or: induration of 1–4 mm.
D=Induration of 5–7 mm.
E=Induration of 8–9 mm.
F=Induration of 10–11 mm.
G=Induration of 12–14 mm.
H=Induration of 15 mm. or more

APPENDIX—Continued

Correlation between the degree of response[1] *to the stated dilution of the test product and to the standard 1:1000 dilution of H–15*—Continued

1:1000 H–15 (right arm)

1:1000 H–15 (left arm)	A	B	C	D	E	F	G	H	Total
A	104	1	4	1	--	--	--	--	110
B	--	1	--	2	--	--	--	--	3
C	2	--	2	4	1	--	--	--	9
D	5	1	3	22	15	6	--	--	52
E	--	--	3	26	21	17	3	--	70
F	1	--	--	7	20	22	10	--	60
G	--	--	--	1	4	8	5	5	23
H	--	--	--	1	--	1	2	--	4
Total	112	3	12	64	61	54	20	5	331

1:1000 H–15

4:1000 H–41	A	B	C	D	E	F	G	H	Total
A	114	1	3	2	--	4	--	--	124
B	--	--	--	1	--	1	--	--	2
C	--	1	2	6	3	2	--	1	15
D	--	--	3	13	8	11	3	--	38
E	1	--	2	1	5	42	5	--	56
F	1	--	1	--	9	56	49	6	122
G	--	--	--	--	2	29	20	4	55
H	--	--	--	--	--	--	5	1	6
Total	116	2	11	23	27	145	82	12	418

1:1000 H–15 (right arm)

1:1000 H–15 (left arm)	A	B	C	D	E	F	G	H	Total
A	86	1	--	1	--	--	--	--	88
B	3	2	--	--	--	--	--	--	5
C	3	--	3	--	2	--	--	--	8
D	1	--	2	4	3	2	--	--	12
E	1	--	--	4	7	10	1	1	24
F	--	--	--	2	8	19	15	--	44
G	--	1	--	1	4	19	24	9	58
H	--	--	--	--	--	1	9	19	29
Total	94	4	5	12	24	51	49	29	268

1:1000 H–15

8:1000 H–41	A	B	C	D	E	F	G	H	Total
A	115	--	2	1	1	1	--	--	120
B	2	--	1	--	1	--	--	--	4
C	--	--	--	3	3	--	--	--	6
D	--	1	2	14	14	13	1	1	46
E	1	--	1	14	8	14	10	--	48
F	--	1	--	8	31	42	23	2	107
G	--	--	--	1	6	22	20	11	60
H	--	--	--	--	1	2	9	16	28
Total	118	2	6	41	65	94	63	30	419

1:1000 H–15 (right arm)

1:1000 H–15 (left arm)	A	B	C	D	E	F	G	H	Total
A	45	4	--	--	--	--	--	--	49
B	2	2	--	--	--	--	--	--	4
C	3	1	9	4	3	--	--	--	20
D	1	1	3	16	22	3	--	--	46
E	1	1	2	13	7	8	1	--	33
F	--	--	2	6	19	11	12	1	51
G	--	--	--	--	1	5	15	4	25
H	--	--	--	--	--	2	4	4	10
Total	52	9	16	39	52	29	32	9	238

1:1000 H–15

8:1000 H–41	A	B	C	D	E	F	G	H	Total
A	79	1	1	1	--	--	--	--	82
B	1	1	--	--	1	--	--	--	3
C	1	--	2	3	1	2	--	--	9
D	--	--	4	2	7	7	--	1	21
E	--	--	1	3	5	18	--	1	28
F	3	2	--	--	5	21	22	2	55
G	--	--	--	--	4	21	25	4	54
H	--	--	--	--	1	4	5	6	16
Total	84	4	8	9	24	73	52	14	268

1:1000 H–15 (bottle No. 1)

1:1000 H–15 (bottle No. 2)	A	B	C	D	E	F	G	H	Total
A	177	1	--	2	--	--	--	--	180
B	--	--	--	2	--	--	--	--	2
C	--	--	--	--	--	--	--	--	--
D	2	--	--	29	12	7	--	--	50
E	--	--	--	12	15	19	2	1	49
F	--	--	--	5	21	23	18	4	71
G	--	--	--	--	2	16	11	7	36
H	--	--	--	--	1	4	7	5	17
Total	179	1	--	50	51	69	38	17	405

1:1000 H–15

16:1000 H–41	A	B	C	D	E	F	G	H	Total
A	42	--	--	1	--	--	--	--	43
B	2	3	1	--	--	--	--	--	6
C	4	1	2	--	--	--	--	--	7
D	3	1	7	9	6	3	--	--	29
E	--	1	1	10	9	2	2	--	25
F	--	--	1	6	13	10	6	--	36
G	--	1	--	2	6	9	8	3	29
H	--	--	--	--	--	3	5	5	13
Total	51	7	12	28	34	27	21	8	188

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[1] A = No response.
B = Erythema only, less than 10 mm.
C = Either: erythema only, 10 mm. or more
or: induration of 1–4 mm.
D = Induration of 5–7 mm.
E = Induration of 8–9 mm.
F = Induration of 10–11 mm.
G = Induration of 12–14 mm.
H = Induration of 15 mm. or more

APPENDIX—Continued

Correlation between the degree of response[1] *to the stated dilution of the test product and to the standard 1:1000 dilution of H–15*—Continued

1:1000 H–15

4:1000 H–42	A	B	C	D	E	F	G	H	Total
A	131	2	--	3	--	2	--	--	138
B	4	--	--	1	2	--	--	--	7
C	1	--	3	1	--	--	--	--	5
D	--	--	--	3	12	4	2	--	21
E	--	--	--	6	7	26	6	2	47
F	--	--	--	1	8	31	46	6	92
G	--	--	--	--	1	10	56	23	90
H	--	--	--	--	--	--	9	19	28
Total	136	2	3	15	30	73	119	50	428

1:1000 H–15

8:1000 H–42	A	B	C	D	E	F	G	H	Total
A	116	--	1	--	--	1	--	--	118
B	--	--	--	--	--	--	--	--	--
C	--	--	--	1	--	--	--	--	1
D	--	--	--	3	3	--	--	--	6
E	--	--	--	4	7	16	11	1	39
F	--	1	1	4	15	35	26	5	87
G	--	--	--	1	3	28	102	17	151
H	--	--	--	--	--	2	18	28	48
Total	116	1	2	13	28	82	157	51	450

1:1000 H–15

8:1000 H–42	A	B	C	D	E	F	G	H	Total
A	69	1	2	1	2	1	1	--	77
B	2	5	2	1	--	--	2	--	12
C	4	--	6	7	2	2	--	--	21
D	2	1	5	1	8	9	--	--	26
E	--	--	1	9	8	12	3	--	33
F	2	--	1	2	9	21	16	3	54
G	--	--	--	--	1	7	12	5	25
H	--	--	--	--	--	1	1	4	6
Total	79	7	17	21	30	53	35	12	254

1:1000 H–15

16:1000 H–42	A	B	C	D	E	F	G	H	Total
A	50	--	--	--	1	--	--	--	51
B	6	1	--	--	--	1	--	--	8
C	7	3	3	--	1	--	--	--	14
D	8	5	7	4	3	5	--	--	32
E	2	--	4	9	2	10	1	--	28
F	2	--	--	9	9	9	6	1	36
G	--	--	--	1	6	19	14	6	46
H	--	--	--	--	2	9	11	14	36
Total	75	9	14	23	24	53	32	21	251

1:1000 H–15

10:1000 H–42	A	B	C	D	E	F	G	H	Total
A	58	2	3	--	--	--	--	--	63
B	--	1	2	1	--	--	--	--	4
C	2	1	12	7	2	1	1	--	26
D	--	--	1	3	6	9	--	--	19
E	--	--	--	2	8	27	3	--	40
F	--	--	--	2	13	22	25	6	68
G	--	--	--	--	1	7	6	7	21
H	--	--	--	--	1	2	6	22	31
Total	60	4	18	15	31	68	41	35	272

1:1000 H–15

10:1000 H–42	A	B	C	D	E	F	G	H	Total
A	141	--	3	1	--	1	--	--	146
B	--	--	--	--	--	--	--	--	--
C	1	--	--	1	--	1	--	--	3
D	1	--	5	7	4	1	2	--	20
E	1	--	2	1	3	5	--	--	12
F	1	--	--	6	14	25	18	2	66
G	--	--	--	1	2	15	17	3	38
H	--	--	--	--	1	2	4	18	25
Total	145	--	10	17	24	50	41	23	310

1:1000 H–15

10:1000 H–42	A	B	C	D	E	F	G	H	Total
A	132	--	1	--	--	--	--	--	133
B	1	--	--	--	--	--	--	--	1
C	3	--	4	1	--	--	--	--	8
D	--	--	--	11	13	3	--	--	27
E	--	--	--	6	9	12	--	--	27
F	--	--	--	1	18	40	10	2	71
G	--	--	--	--	--	21	14	4	39
H	--	--	--	--	--	1	10	4	15
Total	136	--	5	19	40	77	34	10	321

1:1000 H–15

10:1000 H–42	A	B	C	D	E	F	G	H	Total
A	327	--	--	--	2	--	--	--	329
B	--	--	--	--	--	--	--	--	--
C	1	--	1	--	--	1	--	--	3
D	4	--	5	18	5	1	--	--	33
E	--	--	--	43	18	8	--	--	69
F	--	--	--	15	47	35	5	--	102
G	--	--	--	--	6	50	5	--	61
H	--	--	--	--	1	1	1	1	4
Total	332	--	6	76	79	96	11	1	601

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[1] A=No response.
B=Erythema only, less than 10 mm.
C=Either: erythema only, 10 mm. or more
or: induration of 1–4 mm.
D=Induration of 5–7 mm.
E=Induration of 8–9 mm.
F=Induration of 10–11 mm.
G=Induration of 12–14 mm.
H=Induration of 15 mm. or more

APPENDIX—Continued

Correlation between the degree of response[1] *to the stated dilution of the test product and to the standard 1:1000 dilution of H–15*—Continued

1:1000 H–15

4:1000 H–43	A	B	C	D	E	F	G	H	Total
A	140	--	--	1	1	1	--	--	143
B	--	--	--	--	--	--	--	--	--
C	--	--	1	--	5	3	--	--	9
D	--	--	--	2	4	3	--	--	9
E	--	--	--	2	3	5	3	--	13
F	--	--	--	--	5	3	9	8	25
G	--	--	--	--	--	4	4	10	18
H	--	--	--	--	--	1	--	6	7
Total	140	--	1	5	18	20	16	24	224

1:1000 H–15

4:1000 H–44	A	B	C	D	E	F	G	H	Total
A	172	--	2	--	--	--	--	--	174
B	--	--	--	--	--	--	--	--	--
C	--	--	12	6	2	2	--	--	22
D	--	--	3	3	7	4	--	--	17
E	1	--	1	4	3	9	4	3	25
F	--	--	--	2	3	7	10	4	26
G	--	--	--	--	--	4	2	3	9
H	--	--	--	--	--	1	--	3	4
Total	173	--	18	15	15	27	16	13	277

1:1000 H–15

8:1000 H–43	A	B	C	D	E	F	G	H	Total
A	325	1	--	--	--	--	--	--	326
B	--	2	--	1	--	--	--	--	3
C	4	--	14	4	1	1	--	--	24
D	--	--	2	13	8	4	--	--	27
E	--	--	1	12	5	17	4	--	39
F	--	--	--	5	14	16	16	8	59
G	--	--	--	--	3	12	10	2	27
H	--	--	--	--	2	3	4	16	25
Total	329	3	17	35	33	53	34	26	530

1:1000 H–15

6:1000 H–44	A	B	C	D	E	F	G	H	Total
A	204	--	2	--	--	--	--	--	206
B	--	--	--	--	--	--	--	--	--
C	--	--	5	1	1	--	--	--	7
D	--	--	1	--	4	2	--	--	7
E	--	--	--	3	8	6	1	--	18
F	1	--	--	2	5	4	3	--	15
G	--	--	--	--	4	6	--	3	13
H	--	--	--	--	1	2	2	7	12
Total	205	--	8	6	23	20	6	10	278

1:1000 H–15

1:1000 Lilly	A	B	C	D	E	F	G	H	Total
A	106	--	1	4	--	3	1	--	115
B	--	--	--	--	--	--	--	--	--
C	1	--	1	7	5	9	3	3	29
D	--	--	1	--	3	16	7	15	42
E	--	--	--	--	--	4	3	12	19
F	--	--	--	1	--	3	2	6	12
G	--	--	--	--	--	1	1	4	6
H	--	--	--	--	--	--	--	1	1
Total	107	--	3	12	8	36	17	41	224

1:1000 H–15

8:1000 H–44	A	B	C	D	E	F	G	H	Total
A	186	--	--	--	--	--	--	--	186
B	1	1	--	--	--	--	--	--	2
C	3	--	9	--	--	--	--	--	12
D	--	--	2	3	3	1	--	--	9
E	2	--	--	4	3	4	--	--	13
F	--	--	2	5	8	9	5	--	29
G	--	--	--	2	2	5	8	4	21
H	--	--	--	--	1	2	5	15	23
Total	192	1	13	14	17	21	18	19	295

1:1000 H–15

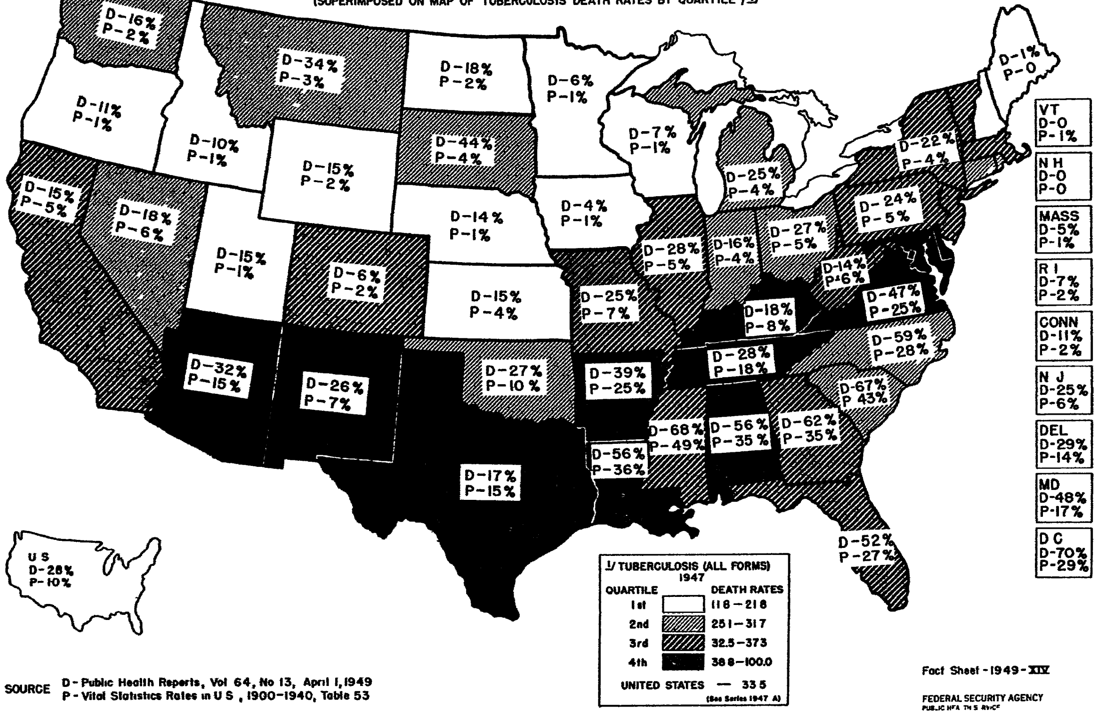
1:100 Lilly	A	B	C	D	E	F	G	H	Total
A	332	--	2	--	--	--	--	--	334
B	--	2	--	1	--	--	--	--	3
C	2	--	2	3	1	--	--	--	8
D	2	--	--	43	25	6	--	--	76
E	--	--	--	16	37	33	3	--	89
F	--	--	--	4	18	64	27	5	118
G	--	1	--	3	4	20	20	2	50
H	--	--	--	1	--	3	12	7	23
Total	336	3	4	71	85	126	62	14	701

[1] A=No response.
B=Erythema only, less than 10 mm.
C=Either: erythema only, 10 mm. or more
or: induration of 1–4 mm.
D=Induration of 5–7 mm.
E=Induration of 8–9 mm.
F=Induration of 10–11 mm.
G=Induration of 12–14 mm.
H=Induration of 15 mm. or more

PERCENT NONWHITE: TUBERCULOSIS DEATHS AND POPULATION BY STATES, 1947

PERCENT THAT NONWHITE TUBERCULOSIS DEATHS (D) ARE OF ALL TUBERCULOSIS DEATHS
PERCENT THAT NONWHITE POPULATION (P) IS OF TOTAL POPULATION

(SUPERIMPOSED ON MAP OF TUBERCULOSIS DEATH RATES BY QUARTILE) 1/



SOURCE D - Public Health Reports, Vol 64, No 13, April 1, 1949
P - Vital Statistics Rates in U S, 1900–1940, Table 53

Fact Sheet - 1949 - XIV

FEDERAL SECURITY AGENCY
PUBLIC HEALTH SERVICE
DIVISION OF TUBERCULOSIS

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APRIL 15, 1950

Influenza

For the current week in the Nation, reported cases of influenza dropped sharply when compared with the preceding week, from 15,222 to 10,268. For the corresponding week last year 2,606 cases were reported. The cumulative total for the first 15 weeks of 1950 is 217,468 which may be compared with the corresponding total of 61,035 for the same period in 1949 and 266,137 for 1947, the highest on record during the past 5 years. The corresponding 5-year (1945–49) median is 126,054. Iowa reported 165 cases as compared with 1 last week.

Corrected figures from Kentucky give 224 cases of influenza for the current week and 331 for the preceding week.

Other Notifiable Diseases

Whooping cough increased from 2,373 cases reported last week to 2,467 for the current week which is above the 5-year (1945–49) median of 2,149. The cumulative total is 38,685 which is higher than the median of 32,906. The corresponding figure for 1949 was 14,971.

Infectious encephalitis increased from 8 cases last week to 24 for the current week. The 5-year median is 7 cases. The cumulative total for 15 weeks of 1950 is 199 which may be compared with the 5-year median of 116.

Diphtheria, measles, meningococcal meningitis, scarlet fever, typhoid fever, and Rocky Mountain spotted fever are all below their 5-year medians.

One case of anthrax was reported in Massachusetts; 62 cases of acute poliomyelitis were reported, 16 in California; and 16 cases of tularemia were reported for the current week. No smallpox was reported in the United States.

A typhoid epidemic among children aged 6 to 11 years in Spenard, a suburb of Anchorage, Alaska, was reported with 12 cases confirmed.

Telegraphic case reports from State health officers for the week ended April 15, 1950

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	---	---	6	32	---	9	---	---	7	---	---	---	44	---
New Hampshire	---	---	5	---	---	2	---	---	---	---	---	---	1	---
Vermont	1	---	---	14	1	---	---	---	3	---	---	---	9	---
Massachusetts	3	1	---	636	4	---	---	---	155	---	---	2	143	---
Rhode Island	---	---	2	15	---	13	---	---	5	---	---	---	38	---
Connecticut	---	---	10	69	1	60	---	---	36	---	---	---	121	---
MIDDLE ATLANTIC														
New York	4	4	[2] 7	1,468	9	368	1	---	[3] 146	---	---	5	120	16
New Jersey	---	4	15	1,066	2	73	---	---	55	---	---	2	105	---
Pennsylvania	6	---	---	565	7	161	---	---	113	---	---	4	151	
EAST NORTH CENTRAL														
Ohio	8	---	8	481	8	76	3	---	195	---	---	2	182	11
Indiana	9	3	20	445	1	10	1	---	49	---	---	---	48	---
Illinois	1	3	31	517	5	108	2	---	62	---	2	---	74	2
Michigan	4	1	7	1,383	6	75	4	---	103	---	---	---	129	3
Wisconsin	---	1	159	487	3	12	1	---	86	---	---	3	128	---
WEST NORTH CENTRAL														
Minnesota	3	---	35	147	1	36	---	---	23	---	---	---	60	---
Iowa	---	---	165	970	---	4	1	---	7	---	---	---	4	8
Missouri	---	---	15	56	4	30	---	---	32	---	2	---	35	---
North Dakota	---	2	78	16	1	21	---	---	---	---	---	---	---	---
South Dakota	2	---	---	26	---	1	---	---	5	---	---	---	4	---
Nebraska	---	---	---	108	1	---	2	---	9	---	---	---	1	---
Kansas	1	---	5	49	3	21	1	---	21	---	---	---	34	---
SOUTH ATLANTIC														
Delaware	---	---	---	4	---	---	---	---	1	---	---	---	5	---
Maryland	1	---	36	48	2	46	---	---	22	---	---	---	49	---
District of Columbia	---	---	1	67	2	8	---	---	2	---	---	---	1	---
Virginia	4	---	1,448	108	1	109	2	---	15	---	2	1	76	4
West Virginia	3	---	658	321	2	13	---	---	8	---	---	---	59	11
North Carolina	6	---	---	177	1	---	1	---	14	---	---	1	43	---
South Carolina	4	---	89	84	1	12	---	---	10	---	---	1	6	8
Georgia	2	---	101	88	1	17	---	1	10	---	3	2	8	11
Florida	2	---	7	129	1	21	1	---	3	---	---	1	5	1

EAST SOUTH CENTRAL														
Kentucky	2	---	224	231	3	33	---	---	25	---	---	---	31	17
Tennessee	2	1	175	165	4	---	---	---	26	---	---	1	20	14
Alabama	7	---	420	187	3	78	---	---	11	---	---	1	19	10
Mississippi	4	1	103	67	1	56	---	---	4	---	1	1	7	5
WEST SOUTH CENTRAL														
Arkansas	1	---	2,145	47	4	87	---	---	7	---	4	2	32	3
Louisiana	3	---	3	12	---	41	1	---	2	---	---	---	4	---
Oklahoma	1	---	328	8	3	51	---	---	11	---	---	1	18	4
Texas	17	1	3,531	731	5	505	14	---	36	---	---	5	237	20
MOUNTAIN														
Montana	---	---	58	86	1	1	---	---	8	---	1	---	6	---
Idaho	---	---	94	19	---	---	---	---	5	---	---	---	73	---
Wyoming	---	---	---	26	---	2	1	---	---	---	---	---	1	---
Colorado	---	---	18	59	1	26	6	---	6	---	---	---	6	2
New Mexico	---	---	---	41	---	36	1	---	4	---	---	1	11	---
Arizona	---	---	186	114	---	40	3	---	8	---	---	---	30	1
Utah	---	---	2	264	---	3	---	---	2	---	1	---	25	---
Nevada	---	---	---	7	---	---	---	---	---	---	---	---	---	---
PACIFIC														
Washington	2	---	25	55	5	1	---	---	22	---	---	---	61	---
Oregon	---	---	40	19	1	49	---	---	20	---	---	1	24	---
California	4	2	8	534	5	33	16	---	119	---	---	2	179	1
Total	107	24	10,268	12,248	104	2,348	62	1	1,513	---	16	39	2,467	153
Median, 1945–49	230	7	2,044	25,616	122	---	32	3	2,381	9	14	49	2,149	---
Year to date 15 weeks	2,233	199	[4] 217,468	119,562	1,443	38,638	1,388	16	26,395	19	316	681	38,685	2,321
Median, 1945–49	4,231	116	126,054	250,733	1,322	---	573	10	41,671	77	294	683	32,906	---
Seasonal low week ends	(27th) July 9	---	(30th) July 30	(35th) Sept. 3	(37th) Sept. 17	---	(11th) Mar. 18	---	(32d) Aug. 13	(35th) Sept. 3	---	(11th) Mar. 18	(39th) Oct. 1	
Since seasonal low week	6,504	---	[4] 247,998	138,692	2,356	---	251	---	42,834	39	---	171	60,221	---
Median, 1944–45 to 1948–49	11,797	---	169,612	285,679	2,294	---	119	---	67,290	131	---	208	58,674	---

---

[1] Including cases reported as salmonellosis.

[2] New York City only.

[3] Including cases reported as streptococcal sore throat.

[4] Deduction of 990 cases to agree with corrected report from Kentucky. Excludes 40,200 cases estimated by county health officers to have occurred in Kentucky during the period Jan. 1 to Apr. 8, 1950, and 4,000 cases estimated to have occurred in Jones County, Iowa.

Anthrax: Massachusetts, 1 case.

Alaska: Influenza 19, scarlet fever 7, typhoid 12.

Hawaii: No cases reported.

PLAGUE INFECTION IN THE STATE OF WASHINGTON

Under date of April 14, 1950, plague infection was reported proved in the following: A specimen of 378 fleas, 228 *Megabothris clantoni johnsoni*, 83 *Thrassis bacchi johnsoni*, 41 *Catallagia decipiens*, 25 *Monopsylla Wagneri* sp,. and 1 *Atyphloceras* sp., taken from 21 sagebrush voles, *Lagurus curtatus*, trapped March 29, 1950, 7 miles north of Farmer in Douglas County; and specimens of 420 and 520 fleas taken from 28 sagebrush voles, *Lagurus curtatus*, and 81 white-footed mice, *Peromyscus maniculatus*, respectively. The latter sagebrush voles and the white-footed mice were trapped April 7, 1950, 5 miles south of Wilber in Lincoln County.

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—February 1950.—Certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Panama City		Colon		Canal Zone		Outside the zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	11				17		4		32	
Diphtheria				1			3		3	1
Dysentery:										
Amebic							7		7	
Bacillary	1				3		4		8	
Food poisoning, bacterial							1		1	
German measles					1				1	
Hepatitis, infectious							1		1	
Malaria [1]	1				4		66		71	
Measles	1		1		129		3		134	
Mumps	1				59				60	
Pneumonia		8		2	21	2			21	12
Tuberculosis		13		3	1	1			1	17
Typhoid fever							1		1	
Whooping cough	19		1	1	10		17		47	1

[1] 2 recurrent cases.

NOTE.—Cases are listed by place of residence except when place of infection is known.

DEATHS DURING WEEK ENDED APRIL 15, 1950

	Week ended Apr. 15, 1950	Corresponding week, 1949
Data for 94 large cities of the United States:		
Total deaths	9,718	9,232
Median for 3 prior years	9,232	
Total deaths, first 15 weeks of year	148,766	147,369
Deaths under 1 year of age	612	608
Median for 3 prior years	659	
Deaths under 1 year of age, first 15 weeks of year	9,458	9,915
Data from industrial insurance companies:		
Policies in force	69,822,892	70,481,914
Number of death claims	14,906	10,943
Death claims per 1,000 policies in force, annual rate	11.1	8.1
Death claims per 1,000 policies, first 15 weeks of year, annual rate	9.9	9.7

FOREIGN REPORTS

EGYPT

Cerebrospinal meningitis.—The high incidence of cerebrospinal meningitis continued to be reported in Cairo, Egypt, during the month of March 1950. Two hundred eighty-one cases were recorded in that city for the period March 4–25, with 33 deaths. In Alexandria 61 cases of the disease were reported during the period March 5–18.

FINLAND

Notifiable diseases—February 1950.—Cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Diphtheria	104	Scarlet fever	741
Dysentery	2	Typhoid fever	10
Meningitis, meningococcal	1	Venereal diseases:	
Paratyphoid fever	66	Gonorrhea	423
Poliomyelitis	8	Syphilis	36

JAPAN

Notifiable diseases—4 weeks ended February 25, 1950, and accumulated totals for the year to date.—Certain notifiable diseases were reported in Japan as follows:

Disease	4 weeks ended February 25, 1950		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Diarrhea, infectious	10	-------	10	-------
Diphtheria	1,277	130	2,458	261
Dysentery, unspecified	347	87	619	159
Filariasis	16	-------	21	-------
Influenza	9,163	-------	11,000	-------
Leprosy	31	-------	58	-------
Malaria	51	4	88	11
Measles	4,107	-------	7,308	-------
Meningitis, meningococcal	90	23	175	41
Paratyphoid fever	60	2	137	7
Pneumonia	19,957	-------	39,064	-------
Poliomyelitis	114	-------	248	-------
Puerperal infection	68	-------	140	-------
Rabies	7	-------	13	-------
Scarlet fever	319	3	692	5
Schistosomiasis	31	-------	37	-------
Smallpox	1	-------	3	1
Tetanus	91	-------	205	-------
Trachoma	9,377	-------	16,155	-------
Tuberculosis	31,392	-------	56,842	-------
Typhoid fever	220	34	499	82
Typhus fever	476	27	495	29
Venereal diseases:				
Gonorrhea	12,973	-------	24,119	-------
Syphilis	10,850	-------	19,091	-------
Whooping cough	11,797	-------	21,583	-------

NOTE.—The above figures include delayed and corrected reports.

MADAGASCAR

Notifiable diseases—February 1950.—Notifiable diseases were reported in Madagascar and Comoro Islands as follows:

Disease	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Beriberi			2	
Bilharziasis			48	1
Diphtheria	3		7	
Dysentery:				
Amebic	9	1	395	8
Bacillary			270	18
Erysipelas			24	
Influenza	23		3, 462	72
Leprosy			50	
Malaria	327	3	43, 589	282
Measles	1		58	
Meningitis, meningococcal			6	3
Mumps	2		195	
Paratyphoid fever	1			
Plague			9	6
Pneumonia:				
Broncho			273	69
Pneumococcic			328	65
Poliomyelitis			1	
Puerperal infection			2	
Scarlet fever	4		2	
Trachoma			1	
Tuberculosis, pulmonary	10	3	123	16
Typhoid fever	5		22	4
Whooping cough			264	14

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India.—During the week ended April 1, 1950, 365 cases of cholera (with 136 deaths) were reported in Calcutta, and 346 cases were reported in that city for the week ended April 8.

Pakistan.—During the week ended April 1, 1950, three fatal cases of cholera were reported in Chittagong, and seven cases for the week ended April 8. In Dacca eight cases with six deaths were reported for the week ended March 25.

Plague

Burma.—Two fatal cases of plague were reported in the seaport of Henzada during the week ended March 11, 1950. During the week ended April 8, one case was reported in Rangoon.

India.—During the week ended April 8, 1950, plague was reported in certain cities in India as follows: Allahabad four cases (imported), Cawnpore two cases, Bombay one case.

Peru.—During the period February 1–28, 1950, three cases of plague were reported in Huancabamba Province, Piura Department.

Rhodesia (Northern).—During the week ended March 25, 1950, two fatal cases of plague were reported in Northern Rhodesia.

Venezuela.—During the period April 5–11, 1950, five cases of plague (one fatal) were reported in Tacata, Miranda State.

Smallpox

Bahrein Islands.—During the week ended April 1, 1950, 22 cases of smallpox were reported in Bahrein, Bahrein Islands.

Burma.—During the week ended March 25, 1950, 233 cases of smallpox, with 119 deaths, were reported in Burma, including 87 cases, 40 deaths, in Rangoon, and 33 cases, 17 deaths, in Bassein. One hundred seventy-two cases, with 98 deaths, were reported for the week ended April 1.

China.—During the period March 11–20, 1950, 31 cases of smallpox with 16 deaths were reported in Swatow. For the week ended April 1, 13 cases were reported in Shanghai.

India.—Smallpox has been reported in India as follows: Week ended April 1, 1950, Calcutta 242 cases, 205 deaths; Madras 174 cases, 38 deaths; week ended April 8, 1950, Calcutta 218 cases, Madras 178 cases.

Typhus Fever

Japan.—During the week ended April 1, 1950, 10 cases of typhus fever were reported in Tokyo and 19 cases in Yokohama.

Notice

A limited number of copies of "The Leading Causes of Death in the United States and States, 1947," issued this month by the Division of Tuberculosis, are available for free distribution. The 18-page pamphlet can be obtained upon request from the Publications Section, Division of Tuberculosis, Public Health Service, Washington, D. C.

✦ ✦ ✦

The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

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Public Health Reports

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Reported Communicable Diseases, 1949

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PUBLIC HEALTH SERVICE

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PUBLIC HEALTH SERVICE
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Public Health Reports

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Relationship of Coliform Bacteria to Gas Production in Media Containing Lactose

By Cecil W. Chambers*

The coliform group of bacteria has been the subject of much research. However, there is a dearth of material dealing with the bacterial population necessary to produce gas in lactose broth. Also, it would appear that the value of such information for use in interpreting the results obtained from the examination of water samples for the presence of coliform bacteria has been overlooked.

In this investigation an attempt has been made, with the equipment and media generally used in the routine examination of water samples, to determine the number of coliform bacteria required to produce gas in lactose broth (*1*). The need for such information is evident when the following known facts are considered.

In any liquid medium, under a given set of conditions, there is a maximum bacterial population which cannot be exceeded (*2*). In water analyses, the ratio of coliforms to other bacteria varies greatly from sample to sample. When water is inoculated into lactose broth, a reproduction race is started which ends only when the maximum population is attained. Hence, under many conditions, it might easily be possible for the population to become stabilized before coliforms were present in sufficient numbers to produce visible gas, even though many were present in the original sample. If this were true, then the production of gas, as well as the amount of gas produced, would depend on the ratio of coliforms to the other bacteria present rather than on the number of coliforms alone. It is hoped that the data obtained in this investigation will be useful in establishing the true significance of gas production in the coliform test and in stimulating additional research on this problem.

Methods

Thirty-two pure cultures of coliform bacteria were isolated from feces. Six of these cultures were selected for this study on the basis of their colony appearances on E.M.B. agar. The cultures exhibited distinctive appearances which varied from a mucoid *Aerobacter aerogenes* through intermediate colonial forms to typical *Escherichia coli* and are designated by numbers 12, 17, 18, 22, 23, and 28. The differential characteristics of the cultures used are shown in table 1.

---

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Cultures used in this study were grown on nutrient agar slants which were incubated for 24 hours at 37° C. These slants were inoculated from young agar slant cultures. A suspension of culture was prepared by introducing 1–2 ml. of sterile phosphate buffered dilution water (*1*) onto the slant. The surface was rubbed gently with a pipette in order to dislodge the growth, being careful not to crush the agar. This concentrated suspension was transferred from the slant to a bottle of sterile phosphate buffered dilution water which was agitated vigorously. The volume of dilution water in the bottle was adjusted to provide the concentration of bacteria desired for the various individual experiments. Serial dilutions were necessary in some instances.

Table 1. *Differential characteristics of coliform cultures used*

Culture No.	Gram stain	Eijkman	Gelatin	Indol	Citrate	V.P.	M.R.		Dextrose	Sucrose	Mannitol	Triple sugar iron agar	Lactose
12	−	0	− 7 −14 −21	−	+	+	−	±	AG 24	AG 24	AG 24	AG 24	AG 24
17	−	+	− 7 −14 −21	+	−	−	+	−	AG 24	− 72	AG 24	Y-G 24	AG 24
18	−	+	− 7 −14 −21	+	−	−	+	−	AG 24	− 72	AG 24	Y-G 24	AG 24
22	−	+	− 7 −14 −21	+	−	−	+	−	AG 24	− 72	AG 24	Y-G 24	AG 24
23	−	0	− 7 −14 −21	−	+	+	−	±	AG 24	AG 72	AG 72	Y-G 24	AG 24
28	−	+	− 7 −14 −21	+	−	−	+	−	AG 24	− 72	AG 24	Y-G 24	AG 24

The figures in carbohydrate columns indicate the hour at which observation was made. Gelatin figures indicate time in days. A=Acid. G=Gas. Y=Yellow throughout.

Lactose broth fermentation tubes contained 10 ml. of standard lactose broth (*1*) in 20 mm. by 150 mm. Pyrex tubes fitted with inverted inner tubes 8 mm. by 75 mm. All tubes were stoppered with cotton or aluminum caps and sterilized at 15 pounds steam pressure for 15 minutes. Dilution water and standard nutrient agar were sterilized at 15 pounds for 20 minutes. All glassware was cleaned with either a good detergent or chromic acid cleaning solution, thoroughly rinsed, and sterilized in a hot air oven for 2 hours at 170° C.

The number of bacteria present at the time gas was first visible was determined by agar plate counts. For each lactose broth tube producing gas, duplicate plates were inoculated and poured with standard nutrient agar. Preliminary work established the approximate range of counts to be expected. Consequently, an amount was inoculated into the agar plates which usually gave a count on the plate, before correction for dilution, of 50–200 colonies. Routine control tests were made for sterility of media and equipment. Plates were incubated at 37° C. for 24 hours, and counts were made with a Quebec colony counter.

Table 2. *The effect of light and heavy inocula on the density of coliform bacteria at the time gas first appeared in lactose broth*

Culture No.	Number of observations	Coliform bacteria [1] in millions per ml.	
		Light inoculum [2]	Heavy inoculum [3]
12	26	186	168
17	26	220	215
18	26	157	169
22	26	209	196
23	25	105	110
28	25	120	185
Mean of grouped data for all cultures	--------	167	174

[1] Mean of grouped data for each individual culture.
[2] Light inoculum=1–40 bacteria per ml.
[3] Heavy inoculum=approximately 40,000,000 bacteria per ml.

Considerable preliminary work was necessary in order to establish numerous steps in the procedure. The number of bacteria inoculated into the lactose broth tubes was varied, in otherwise parallel experiments, as a means of determining the effect of different initial concentrations of inoculum. These results are shown in table 2.

It will be noted that, based on the results from 154 observations, the mean [1] bacterial counts obtained with high and low concentrations of inoculum were nearly identical. The tendency for the counts to be either higher or lower was about equally distributed between results obtained with large and small inocula.

In the early stages of this work, the end-point at which gas was first produced was a cause for concern. However, it was determined that, at least after the 2 mm. bubble stage was reached, the end-point was not critical within a period of one hour or less. Intervals in excess of one hour did not appear to be significant except with culture 12. Results for periods following initial gas production are presented in table 3.

---

[1] In all instances the mean referred to is the arithmetic mean.

Table 3. *Hourly observations of the density of coliform bacteria in lactose broth*

Culture No.	Counts of coliform bacteria in millions per ml.								
	First* gas observed	1 hour after	2 hours after	3 hours after	4 hours after	5 hours after	6 hours after	7 hours after	8 hours after
12	254	264	310	455	335	585	600	630	665
17	252	246	251	245	240	264	245	254	274
18	259	234	216	223	212	246	212	270	--------
22	208	235	190	220	204	220	204	--------	--------
23	179	195	170	170	168	170	162	--------	--------
28	214	259	244	250	221	216	181	--------	--------

*These figures represent single observations.

Experimental Procedure

Lactose broth fermentation tubes were inoculated with bacterial suspensions prepared as previously described. The number of bacteria inoculated into lactose broth varied. This was necessary in order to avoid having a large number of tubes produce gas simultaneously. If this had been permitted, undue delay in planting portions from some of the tubes could have resulted in serious errors. The lactose broth tubes were incubated at 37° C. and were examined at intervals of 30–45 minutes. Each time the cultures were examined they were jarred gently by tilting the rack backward and forward, once, through an arc of about 20°. This cycle was repeated each time the tubes were examined. After tilting, all tubes containing gas in an amount equal to or greater than a 2 mm. bubble were

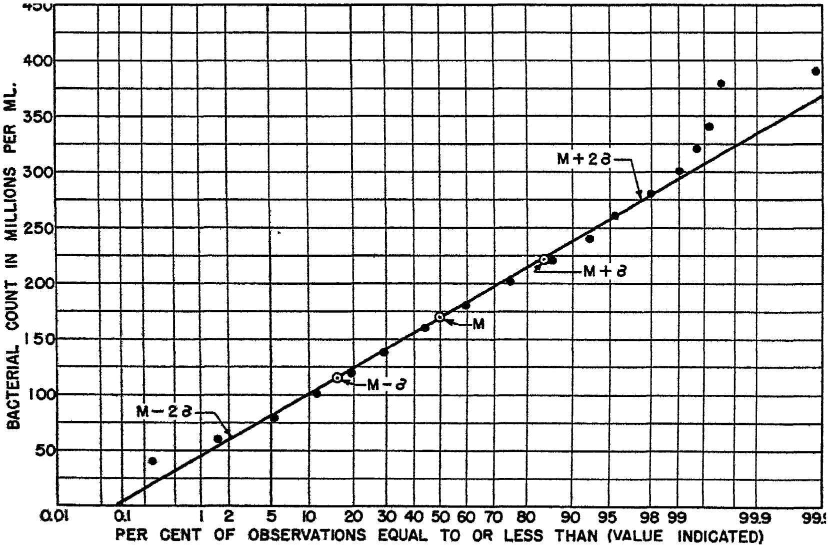

Figure 1. Results from 780 observations in lactose broth.

removed from the rack. These tubes were shaken until most of the broth from the inner tube was mixed with that in the outer tube. Appropriate portions, as previously established by preliminary tests, were immediately removed and inoculated for plate counts. A sufficient number of parallel tests were made to establish the practical reproducibility of the procedure.

Results

An examination of figure 1 indicates that 95.4 percent of the results obtained fall within two standard deviations of the mean. The coefficient of variation for grouped data on all cultures is 31.8 percent.

Table 4. *Range of coliform bacteria counts at the time gas was first produced in lactose broth*

Culture No.	Number of determinations	Minimum individual bacterial count in millions per ml.	Maximum individual bacterial count in millions per ml.	Arithmetic mean in millions per ml.	Median in millions per ml.
12	128	84	346	167	155
17	126	128	306	208	199
18	140	57	391	176	173
22	132	126	391	203	201
23	128	44	187	104	102
28	126	40	256	151	152

Arithmetic mean for 780 determinations=168.
Median mean for 780 determinations=169.

The coefficient of variation for grouped data on individual cultures, table 5, varies from 17.0 to 28.4 percent. Table 4 shows, for each culture at the time gas was first produced, the median and mean bacterial counts, the maximum and minimum individual counts, and the median and mean count for grouped data on all cultures.

Table 5. *Distribution of results at the time gas was first produced in lactose broth*

Culture No.	Number of observations	Coliform bacteria in millions per ml.		Coefficient of variation in percent
		Arithmetic mean	Standard deviation	
12	128	167	46.3	27.7
17	126	208	35.4	17.0
18	140	176	45.5	25.9
22	132	203	38.5	19.0
23	128	104	28.2	27.1
28	126	151	42.9	28.4
All observations	780	168	53.5	31.8

Figure 2 portrays the distribution of individual results for each culture and figure 3 is a composite representation of all data contained in figure 2.

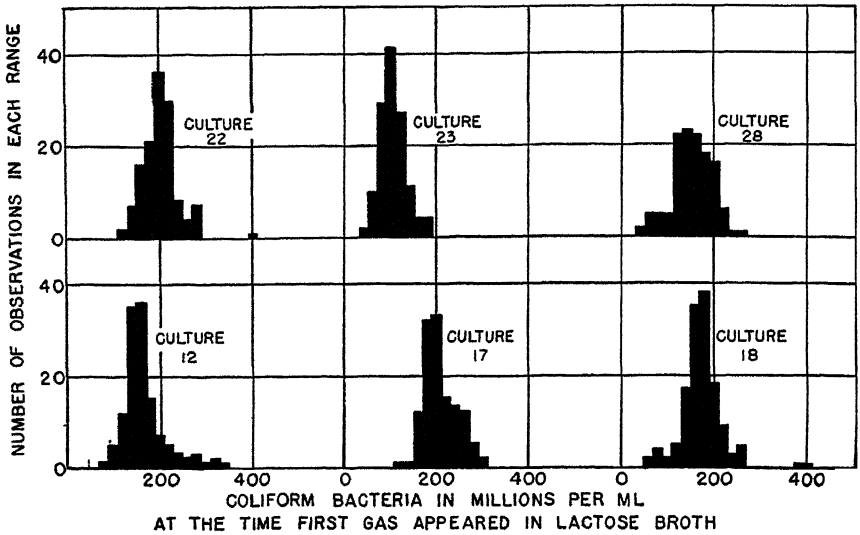

Figure 2. Distribution of results obtained with individual cultures.

Discussion

In examining the results from more than 1,000 tests made in this investigation, there are certain points which should be kept in mind. The most important of these is the fact that this study was undertaken as a means of determining what happens under normal conditions of actual routine operation. Some factors which probably induced variations were not controlled—and for a reason— namely, that they are not controlled in routine work. Therefore, if this work were to have practical value in outlining bacterial count ranges, as well as the distribution within these ranges, it must of necessity be subject to the variations encountered in routine laboratory practice.

The effect of the concentration of inoculum used was investigated. Massive inocula were observed in parallel with light inocula. Massive inoculation with living bacteria included the transfer of relatively greater numbers of dead bacteria and their metabolic products. These dead bacteria and their byproducts could possibly have represented a considerable quantity of active lactase. If this were true, massive inoculation might have been expected to result in gas production with a lesser number of living bacteria than would be the case in parallel tests with light inocula. The results obtained indicated that there was no significant variation attributable to variations in the density of initial inoculation. This was the basis for using relatively heavy inocula in most of the tests. This information may be of further value in stream pollution work if questions arise relative to whether or not the results obtained from grossly polluted samples

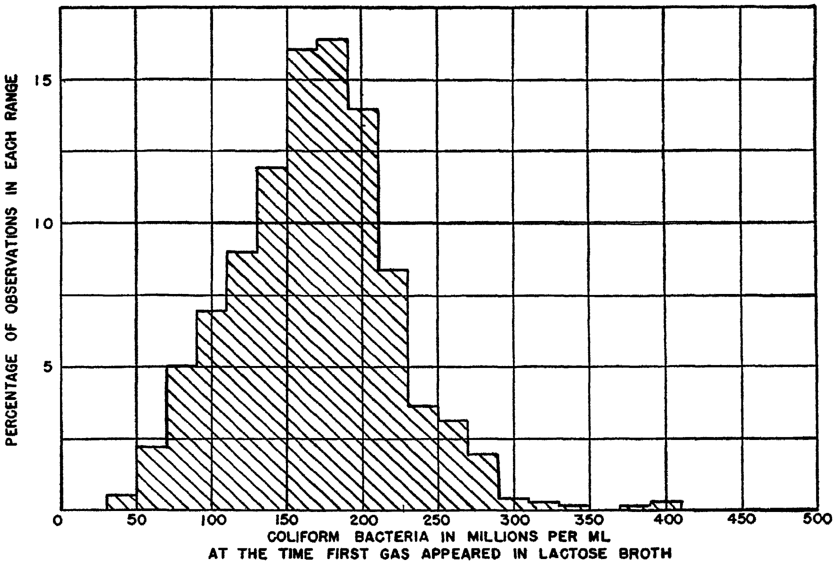

Figure 3. Distribution of results from 780 observations with all cultures.

are comparable with those obtained from relatively pure samples.

Two concentrations, single and double strength, as well as two volumes, 10 ml. and 17 ml., of lactose broth media were compared. The results from these tests did not show any greater variation than those which occurred from day to day when constant volumes and/or concentrations of media were used.

Occasionally the bacterial population in the media outside the inverted tube appeared to be heavier than that on the inside. In some instances, no growth was visible in the inner tube above the level of the surrounding media. Growth was observed in the lower portion of the media in the inner tube at the same time that it occurred in the surrounding media. Consequently, the effect on the count obtained could only have been such as might be attributed to dilution resulting from mixing the content of the inner tube with that of the outer tube before withdrawing portions for plate counts. This may be said by reason of the fact that gas appeared in the inner tube at the time the first effervescence was noted in the surrounding medium.

Cultural activity, with reference to the quantity of gas produced, did not appear to bear any significant relationship to the population required to produce gas.

Thirteen to 16 parallel tests were made in lactose broth and brilliant green bile broth, 2 percent, with each of the cultures 12 to 28, inclusive. Considering the mean bacterial count at the time the first gas was produced in B.G.B. broth as 100 percent for each culture, the following are the percentages obtained in corresponding tests with lactose broth:

Culture	*Percent*
12	64
17	51
18	60
22	50
23	53
28	117

These results, from 88 parallel tests, indicate that the mean bacterial density coincident with initial gas production in lactose broth is only 60 percent as great as the mean for corresponding tests in B.G.B. This suggests the possibility that B.G.B. may interfere with the action of lactase.

The minimum bacterial count obtained on any individual test with lactose broth was 40,000,000 per ml. The mean and median bacterial counts for 780 tests were 168,000,000 per ml. and 169,000,000 per ml., respectively. These data were obtained with pure culture inoculations. In normal water samples, Prescott, Winslow, and McCrady (*3*) show that the coliform bacteria are outnumbered by noncoliforms, which grow in such media, by more than 100 to 1. Thus with normal inoculations in lactose broth, the contest for available food material and population space would soon become acute. Under such conditions the smaller number of coliforms present in the inoculum would experience difficulty in greatly exceeding the population density required to produce visible gas. The magnitude of the minimum coliform population capable of producing visible gas, insofar as the results obtained with cultures used in this study are concerned, would indicate that when the ratio of noncoliforms to coliforms is high, visible gas might not be produced at all, even though coliforms were present in considerable numbers in the original sample. This probably explains why coliforms are isolated occasionally from lactose broth tubes which show growth but no gas, and why confirmatory brilliant green bile broth tubes inoculated from positive lactose broth tubes almost invariably show a greater amount of gas production.

There has been much discussion concerning the minimum quantity of gas which must be produced in lactose broth before the presumptive test may be considered positive. Some workers have insisted that 10 percent or more gas must be produced while others have contended that gas in any amount is significant.

A negative test, to say nothing of one in which a small quantity of gas is produced, certainly does not preclude the possibility that coliforms were present. Furthermore, there is little basis for the requirement that gas must be produced in 10 percent or greater volume before any significance may be attached to the results obtained. The production of gas in any amount is a significant observation.

Conclusions

1. Results obtained with the cultures used in this study indicate that from 40 to 390 millions of coliform bacteria per ml. are required to produce visible gas in lactose broth. The arithmetic mean and the median for 780 determinations was approximately 170 million per ml.

2. Different coliform cultures vary in the population density required to produce gas.

3. In most instances coliform counts of 75 million or more per ml. are required to produce the first visible gas.

4. The number of coliform bacteria originally inoculated into lactose broth has relatively little effect on the population density required to produce gas, but does have a marked effect on the time necessary for gas production.

5. Results from single and double strength media show no significant variation in the number of coliforms required to produce gas.

6. The population required to produce gas in standard lactose broth is about 40 percent less than that required to produce gas in B. G. B. broth 2 percent.

7. The production of gas in any quantity in the presumptive test in lactose broth is highly significant until proved otherwise by subsequent confirmatory or completed tests.

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Experimental Histoplasmosis in a Dog

—A Nonfatal Case—

By Robert W. Menges, Michael L. Furcolow, and Joseph S. Ruhe*

Experimental histoplasmosis in five dogs was described in a recent article by Ruhe and Cazier (*1*). Dog 1 of this group, after showing marked evidence of infection by X-ray and by clinical signs, appeared completely recovered several months after infection. A detailed description of this case is given primarily to point out that nonfatal histoplasmosis may occur in dogs, and to describe the pathology that was observed in a recovered case.

The dog involved was a black-and-white male terrier about 1 year old. On March 17, 1948, the dog was inoculated with 1 cc. of a 1:10 dilution of packed *Histoplasma capsulatum* yeast cells of strain H–629 isolated from a human case in Kansas City, Kansas. The injection was made directly into the right lung, between the 6th and 7th ribs, midway between the shoulder crest and the ventral median line, using a 2-inch 20-gage needle and a 1 cc. glass tuberculin syringe.

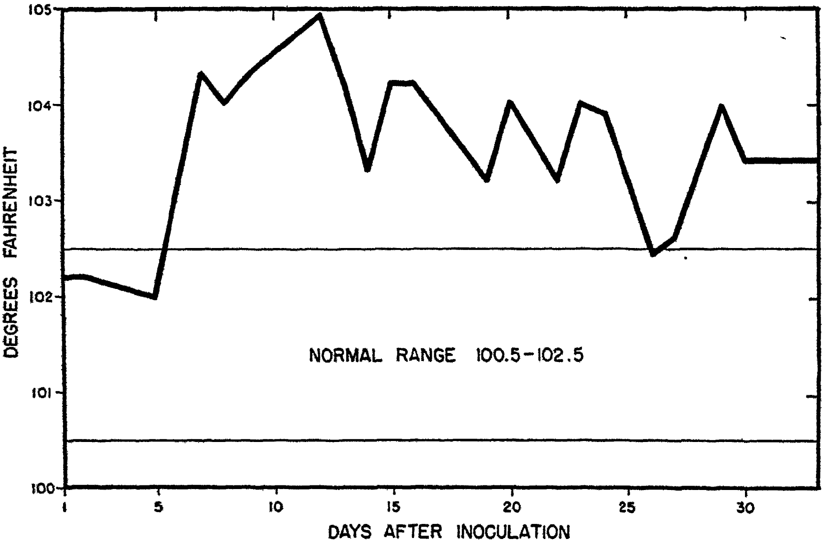

Figure 1. Temperature record of dog 1 inoculated with the yeast phase of *Histoplasma capsulatum.*

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Within 4 or 5 days after inoculation, the dog developed rapid respiration and cough. Its temperature was first found to be elevated on the 7th day and continued elevated with some fluctuation for more than 4 weeks when readings were discontinued. The temperature records are shown in figure 1. Coincidently with the temperature rise, there occurred increasing cough, loss of appetite, roughness of the hair coat, and gradual decline in physical condition which became progressively more marked during the first 4 weeks. The dog then continued in poor condition for about 16 weeks. The first evidence of improvement was noted after the 20th week and became definite by the 24th week. By the 26th week, the dog's general condition was classified as good and later as excellent.

The animal weighed 9.4 kilograms at the time of inoculation. Its weight gradually decreased to 7.9 kilograms during the 3d week. Following this the weight gradually increased to 14.2 kilograms by the 39th week, when the recording of weight was discontinued. The weight record is shown in figure 2.

The histoplasmin skin test using lots H–15 in a 1:100 dilution and H–40 in dilutions of 1:5, 1:10, and 1:100 was negative on March 17, the time of inoculation. Tests with 1:100 histoplasmin were repeated during the 1st, 2d, and 3d weeks and were negative. The first positive reaction occurred 26 days after inoculation when a test was made with a 1:100 dilution of histoplasmin lot H–15. The skin test was positive with either a 1:100 dilution of H–15 or 1:100 and 1:50 dilutions of H–40 on nine occasions during the follow-up period. The last test was performed during the 39th week. Skin tests for other fungus diseases using coccidioidin, haplosporangin, and yeast-phase antigen of *Candida albicans* in dilutions of 1:100 were negative during the 1st

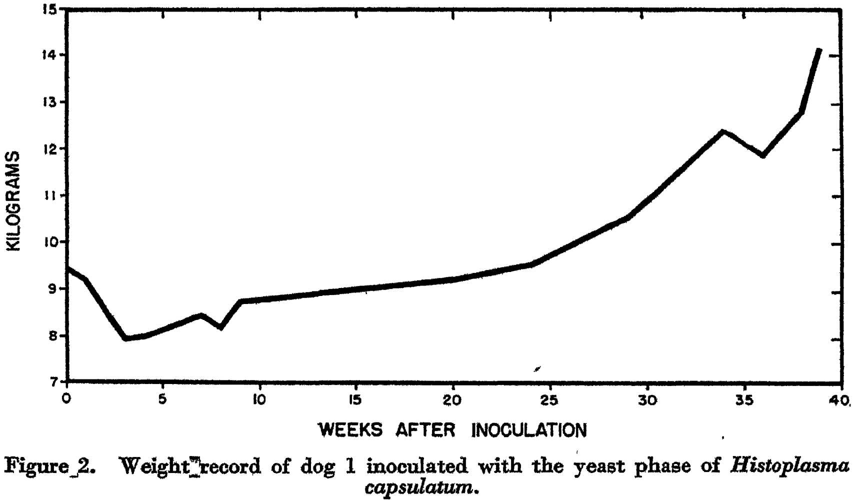

Figure 2. Weight record of dog 1 inoculated with the yeast phase of *Histoplasma capsulatum.*

and 6th weeks. Skin tests using blastomycin (B–7) in a 1:100 dilution were negative the 1st week, but positive the 6th week.

Blood was obtained at intervals over a period of 16 months for the complement fixation test (*2*). Many of the serum samples were hemolyzed and were thus anticomplementary. Three samples, however, were not hemolyzed; and for these, satisfactory results were obtained. Using histoplasmin lot H–40 in a dilution of 1:12.5 as antigen, four plus (++++) reactions were obtained on sera taken during the 2d month, 7th month and the 16th month after inoculation. The 16th month serum was tested at dilutions 1:2, 1:4, 1:8, 1:16, 1:32, and 1:64. The four plus (++++) reaction remained to the 1:16 dilution. The 1:32 dilution gave a three plus (+++) reaction and the 1:64 dilution gave a one plus (+) reaction.

X-rays of the lungs were taken at approximately weekly intervals during the first 2 months to observe changes during infection. The early X-rays were negative. The 14th day after inoculation there was a suggestion of infiltration in the right lung at the site of inoculation. The first marked changes were observed on the 19th day. At that time there was a definite pneumonia on the right side with possible fluid present. These conditions were also observed on X-rays taken the 23d and 30th day. On the 37th day most of the right base appeared consolidated and there was a question of interlobar pleurisy in the left side. X-rays on the 56th day showed a suggestion of clearing of the lesions which was more definite by the 65th day. X-rays during the 5th, 7th, and 8th months showed almost complete clearing of the right lung with the exception of a thin scar at the site of inoculation. There was continual evidence of interlobar pleurisy on the left. These same findings were evident on the last X-ray taken 14 months after inoculation. No evidence of calcification was seen.

The dog was sacrificed July 19, 1949, 16 months after inoculation, using ether anesthesia. An autopsy was performed the same day. On opening the body, a slightly excessive amount of pleural fluid was found. The organs of the thoracic cavity appeared normal with the exception of the left lung which presented a small hardened area on the lateral surface at about the junction of the upper and lower lobes. Several adhesion bands were noted between the pleurae and the apices of both lungs.

The organs of the abdominal cavity appeared normal with exception of the spleen and kidney. The tip of the spleen presented a darkened area not typical of the remainder of the organ. The spleen was not enlarged. The left kidney had a hardened white area about one-eighth inch in diameter, raised from the surface, and resembling fat, but firm. No abnormal lymph nodes were observed.

Portions of the kidney, spleen, and lung were sent to the Armed

Forces Institute of Pathology for histopathological study.[1] The results of their study are given below.

Kidney: There is considerable vascular congestion, particularly in the arciform vessels.

Spleen: In some sharply delimited areas the splenic capsule is thickened, vascular, and somewhat edematous. Underneath the intact serosa are seen numerous blood vessels and immature connective tissue cells, plus several hemosiderin-laden macrophages. This zone is separated from the splenic pulp by a thin layer of lymphoid cells.

Lung: The pleura is thickened in several rather sharply circumscribed zones. This thickening is due to the presence of collagenous connective tissue; only occasionally are leukocytes present.

Comment: It is apparent that this animal has recovered from his experimental infection, both from the histologic as well as clinical points of view.

Portions of both lungs, liver, pancreas, spleen, left kidney, both adrenals, and submaxillary glands were ground and cultured on potato-dextrose agar and brain-heart infusion agar (with streptomycin and penicillin added). Culture plates of each tissue on both types of agar were incubated at 25° C. (room temperature) and 37° C. Cultures were also made of the pleural fluid. All plates were found to be negative for *H. capsulatum.*

Summary

A case of nonfatal experimental histoplasmosis in a dog is described. The clinical symptoms, X-ray findings, and complete autopsy report are given. The case is presented to point out that nonfatal histoplasmosis may occur in dogs, and that only limited pathological lesions may be expected in recovered cases. In addition, *H. capsulatum* was not isolated by culture from any of the organs or tissues at autopsy, indicating that the fungus presumably was destroyed, and showing that the dog demonstrated a definite resistance to the infection.

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[1] Appreciation for permission to quote their findings is expressed to Brig. Gen. Raymond O. Dart and Maj. T. C. Jones, Armed Forces Institute of Pathology, Washington, D. C.

Reported Incidence of Communicable Diseases in the United States, 1949

This summary gives provisional figures on cases of communicable diseases reported by the health departments of each State, Alaska, Hawaii, Panama Canal Zone, Puerto Rico, and the Virgin Islands for the calendar year 1949. The figures represent total cases reported each month during the year and are subject to change by final annual reports released by each State during the following year.

These data are limited by factors which produce great variations in completeness and accuracy of reporting within and between the States. Some of these factors are availability of medical care, accuracy of diagnosis, definition of disease for reporting purposes, and methods of tabulation.

The table gives frequencies of selected communicable diseases by State for 1949. Data for diseases reported with low frequency or by only a few States follow the table.

Poliomyelitis

Provisional figures for the reported incidence of acute poliomyelitis in the United States in the calendar year 1949 were the highest on record—42,173 cases. The incidence rate per 100,000 estimated midyear population was 28.4. For the 5-year period (1944–48), the median was 19,053, with a rate of 14.4. The previous high year occurred in 1916 when nearly 30,000 cases were reported. However, the 1916 incidence was probably more severe, because few nonparalytic cases were reported. The next highest year prior to 1949 was 1948 when 27,902 cases were reported with a rate of 19.1.

Of the nine geographic divisions of the United States shown in the accompanying table, the two highest rates in 1949 are for the West North Central (47.8) and the Mountain (43.7) Divisions. In 1948, the two divisions showing the highest rates were the Pacific (44.7) and the West North Central (37.0). The New England Division was the third highest (37.4) in 1949 as compared with the lowest (4.3) in the preceding year.

The two lowest rates for 1949 occurred in the East South Central (16.5) and the South Atlantic (9. 9) Divisions. In 1948, the two lowest rates were in the East South Central (8.6) and New England (4.3) Divisions.

Rates for the individual States in 1949 ranged from 86.1 in Idaho to 5.5 in South Carolina. The largest number of cases, 5,241, was reported for New York State, and the smallest number, 28, was reported for Nevada.

The peak incidence of acute poliomyelitis occurred in August for the country as a whole when 13,892 cases were reported. However, individual States reported peak months ranging from July for Alabama, Arkansas, Oklahoma, Tennessee, and Texas, to October for Oregon. Of the 42,173 total cases reported for the year, 29,661 were reported in July, August, and September. The smallest number of cases in any one month was 216, reported in April.

Incidence Rates for Poliomyelitis in the United States, Each Division and State, 1948 and 1949

(Rates per 100,000 estimated midyear population present in area)*

Area	1949	1948
United States	28.4	19.1
New England	37.4	4.3
Maine	49.2	4.5
New Hampshire	41.4	4.4
Vermont	41.5	7.2
Massachusetts	38.3	3.8
Rhode Island	26.0	1.1
Connecticut	32.4	6.1
Middle Atlantic	25.4	10.0
New York	36.4	9.9
New Jersey	31.2	16.9
Pennsylvania	7.9	7.1
East North Central	32.8	13.8
Ohio	22.6	15.0
Indiana	28.8	10.1
Illinois	33.6	13.2
Michigan	45.9	12.4
Wisconsin	34.7	19.7
West North Central	47.8	37.0
Minnesota	63.5	48.6
Iowa	46.2	48.2
Missouri	33.7	8.2
North Dakota	74.5	21.8
South Dakota	62.9	153.5
Nebraska	53.0	56.0
Kansas	38.1	17.1
South Atlantic	9.9	23.5
Delaware	14.8	42.7
Maryland	12.2	7.2
District of Columbia	12.1	19.6
South Atlantic—Continued		
Virginia	10.8	18.8
West Virginia	17.9	9.4
North Carolina	6.4	66.3
South Carolina	5.5	19.2
Georgia	7.2	7.5
Florida	11.3	11.6
East South Central	16.5	8.6
Kentucky	24.0	7.1
Tennessee	16.7	11.9
Alabama	8.7	7.4
Mississippi	16.8	7.7
West South Central	33.9	17.1
Arkansas	50.6	7.5
Louisiana	8.7	6.0
Oklahoma	57.0	15.8
Texas	31.3	23.9
Mountain	43.7	18.9
Montana	18.8	13.9
Idaho	86.1	20.3
Wyoming	42.3	28.8
Colorado	55.1	10.3
New Mexico	33.3	14.2
Arizona	24.2	24.1
Utah	43.8	31.8
Nevada	16.1	15.2
Pacific	24.7	44.7
Washington	23.0	15.6
Oregon	18.8	13.4
California	26.1	56.6

*Source of population estimates, Bureau of the Census.

An effort was made to obtain poliomyelitis data by the categories—paralytic, nonparalytic, and unspecified. However, many States were not able to report in this form. Sixteen States reported only paralytic cases, 11 States reported all cases as unspecified, 12 States reported 25 percent or more of the cases as unspecified, and only 10 States (including the District of Columbia) reported both paralytic and nonparalytic cases with less than 25 percent of the cases unspecified as to type. The total percentage distribution of the 8,482 cases in these 10 States (including the District of Columbia) is 47.4 percent paralytic, 39.2 nonparalytic, and 13.4 unspecified. Of the 695 cases reported in Kentucky, 81.3 percent were paralytic, 6.3 nonparalytic, and 12.4 unspecified. The District of Columbia reported 46.7 percent paralytic, 53.3 nonparalytic, and none unspecified. Maryland reported 74.0 paralytic cases, 25.7 nonparalytic, and 0.4 unspecified.

Brucellosis

Reported cases of brucellosis totaled 4,124 for 1949 as compared with 4,886 cases reported during 1948 and a 5-year median of 4,959. The 3 States with the largest number of cases were Illinois (501), Iowa (377), and Texas (341).

Diphtheria

The reported incidence of diphtheria was 8,027 cases as compared with 9,610 the preceding year and a 5-year (1944–48) median of 14,122. This is the lowest number of cases ever recorded in the United States for this disease. The highest number on record was 206,939 cases reported by 46 States in 1922. In 1949 the largest number of cases of diphtheria was reported by Texas (980) and the lowest number by Vermont (1).

Infectious Encephalitis

Reported incidence of acute infectious encephalitis increased from 575 cases in 1948 to 781 cases for 1949. The 5-year (1944–48) median is 667. The largest number of cases was reported in North Dakota (125), 4 States and the District of Columbia reported no cases, and 5 States reported 1 case each. Since 1938, the high year was 1941, when 3,045 cases were reported and the low year 1942, when 564 were reported.

Influenza and Pneumonia

Total reported cases of influenza for 1949 was 108,218, a decrease from the 165,805 reported the previous year. The 5-year (1944–48) median is 443,339. Of the total reported influenza incidence for 1949, South Carolina reported 12,243, Texas reported 58,119, and Virginia reported 10,149 cases.

Reported cases of pneumonia (all forms) increased from 80,072 in 1948 to 82,882 in 1949 but remained below the 5-year (1944–48) median, 104,098. Of the total reported cases of pneumonia for 1949, Texas and Virginia reported a total of 18,901 cases and New York reported 11,362.

Malaria

The reported incidence of malaria for 1949 was 4,231 or less than half the 9,797 cases reported in 1948. The 5-year (1944–48) median is 47,894. Texas reported the largest number of cases, 2,881 for the year. Although definite information is not available, it is probable that the number of true malaria cases was less than the number reported. The reason for this is that some State health departments investigate malaria case reports after the case first has been counted. Resulting changes in diagnosis are not always reflected in the provisional statistics.

Meningococcal Meningitis

The reported incidence of meningococcal meningitis increased slightly over the previous year but remained below the 5-year (1944–48) median. There were 3,469 cases reported in 1949 as compared with 3,375 the previous year and the median of 5,602. Texas reported the highest number of cases (316). Since 1938, the highest number of cases reported was 17,974 in 1943 and the low year was 1940 with 1,631 cases.

Scarlet Fever and Septic Sore Throat

There were 74,913 cases of scarlet fever reported for 1949 which was the lowest number on record since 1913 when only 24 States reported 73,948 cases.

Alongside the decline of reported incidence of scarlet fever, the trend of reported cases of septic sore throat has been upward in recent years. In 1949, 19,867 cases of septic sore throat were reported as compared with the 5-year (1944–48) median, 10,112 cases.

Smallpox

Reported cases of smallpox totaled 56 in both 1948 and 1949. This is the lowest incidence on record since 1912 when 34 States reported 23,204 cases. The high year since 1912 was 1921 when 45 States reported 102,787 cases. In 1949, no cases were reported in the New England or Middle Atlantic Divisions. Texas with 10 cases and Missouri with 8 cases reported the largest number of cases in 1949.

Tuberculosis

Total reported cases of tuberculosis (all forms) were 133,612, as compared with 144,300 for 1948 and a 5-year median of 128,927. Tuberculosis data for 1948 and 1949 were obtained from the Division of Tuberculosis. These figures have been shown for most States (as noted in the table which follows), because they are based on reports, by color, age, and sex, from the States and are assumed to be more reliable on the whole than the totals reported in the provisional monthly morbidity reports from the States.

Tularemia

Reported cases of tularemia increased from 1,093 cases in 1948 to 1,218 cases in 1949. The 5-year median is 1,093. Arkansas and Georgia reported the largest number of cases, 212 and 125, respectively.

Typhoid Fever and Paratyphoid Fever

In 1949, 2,842 cases of typhoid fever were reported in the United States as compared with 2,905 cases the preceding year. The 5-year (1944–48) median is 3,062.

Paratyphoid fever shows a reported incidence of 1,312 cases in 1949, including some cases reported as salmonellosis.

Typhus Fever

Reported cases of typhus fever for 1949 reached a new low (983) since 1939 when 2,960 cases were reported. The high year during that time was 1944 with 5,353 cases reported. The 5-year median (1944–48) is 3,371 cases.

Venereal Diseases

According to information furnished by the Division of Venereal Diseases, total reported cases of syphilis for the calendar year 1949 were 256,191 as compared with 355,925 reported in 1948. The 5-year median is 384,140.

A decrease in reported cases of gonorrhea and other forms of venereal diseases also occurred. For 1949, 317,571 cases of gonorrhea were reported as compared with 345,501 for 1948. A total of 11,067 cases of other venereal diseases were reported, consisting of 6,744 cases of chancroid, 2,398 cases of granuloma inguinale, and 1,925 cases of lymphogranuloma venereum.

Reported Cases of Selected Communicable Diseases in the United States, Each Division and State, 1949

[Includes Territories and Possessions]

Division and State	Brucellosis	Chickenpox	Conjunctivitis	Diphtheria	Dysentery, amebic	Dysentery, bacillary	Dysentery, undefined
New England	131	39, 393	56	453	24	88	
Maine	10	2, 883	1	22	1	4	
New Hampshire	3	889		5			
Vermont	3	2, 654	2	1			
Massachusetts	32	22, 140		343	3	55	
Rhode Island	5	1, 445	1	9	1	8	
Connecticut	78	9, 382	52	73	19	21	
Middle Atlantic	285	104, 942	12	633	955	814	2
New York	149	31, 012	12	243	831	762	
New Jersey	35	43, 178		94	101	35	2
Pennsylvania	101	30, 752		296	23	17	
East North Central	1, 099	85, 765	841	855	1, 006	509	74
Ohio	137	18, 542	1	271	41	23	67
Indiana	44	3, 166	47	394	11	9	7
Illinois	501	16, 236	214	52	441	175	
Michigan	196	21, 517	579	118	503	302	
Wisconsin	221	26, 304		20	10		
West North Central	1, 007	17, 455	233	371	72	119	41
Minnesota	271	3, 678	3	110	54	116	6
Iowa	377	3, 186	80	32	9		1
Missouri	111	3, 034	4	113			34
North Dakota	29	752	7	19	2	2	
South Dakota	45	613	5	14	1		
Nebraska	46	1, 779		24	3		
Kansas	128	4, 413	134	59	3	1	
South Atlantic	406	19, 118	129	2, 030	359	888	5, 907
Delaware	2	479		14			2
Maryland	47	3, 675	9	102	11	18	20
District of Columbia		1, 694		43	5	57	
Virginia	72	4, 990		220	17		5, 870
West Virginia	7	1, 186	11	165		4	1
North Carolina	31			544	94	48	
South Carolina	31	2, 026		336	53	280	
Georgia	130	2, 227	54	400	44	404	14
Florida	86	2, 841	55	206	135	77	
East South Central	201	5, 626	64	1, 304	276	295	61
Kentucky	19	1, 598	61	303	14	40	4
Tennessee	40	2, 037	3	282	135	136	57
Alabama	76	1, 991		358	26		
Mississippi	66			361	101	119	
West South Central	549	27, 789		1, 486	1, 969	23, 632	13, 092
Arkansas	31	1, 622		189	249	326	438
Louisiana	31	615		185	897	8	
Oklahoma	146	1, 751		132	150	20	53
Texas	341	23, 801		980	673	23, 278	12, 601
Mountain	262	17, 118	243	333	256	1, 517	398
Montana	10	2, 777	71	26	1	6	4
Idaho	29	1, 452	98	38	2	11	157
Wyoming	8	781	3	12	1		
Colorado	99	4, 652		70	9	120	
New Mexico	8	976	4	36	29	43	45
Arizona	18	2, 190		114	154	1, 331	176
Utah	86	4, 040		34	58	6	2
Nevada	4	250	67	3	2		14
Pacific	184	56, 118	383	562	457	641	884
Washington	27	9, 304	261	46	51	23	727
Oregon	43	3, 613	122	57	79	118	157
California	114	43, 201		459	327	500	
Total 1949	4, 124	373, 324	1, 961	8, 027	5, 374	28, 503	20, 459
Total 1948	4, 886	331, 431	1, 458	9, 610	4, 510	23, 727	15, 085
Median 1944–48	4, 959	317, 510	1, 458	14, 122	3, 341	24, 164	9, 516
Alaska		330		11			
Hawaii	4	2, 130	62	14	11	83	
Panama Canal Zone	1	378		53	72	39	
Puerto Rico	2	770		411			29
Virgin Islands		33					

Reported Cases of Selected Communicable Diseases in the United States, Each Division and State, 1949—Continued

[Includes Territories and Possessions]

Division and State	Encephalitis, infectious	German measles	Hookworm disease	Influenza	Malaria	Measles	Meningitis meningococcal
New England	35	8,925	3	1,439	14	71,313	151
Maine	4	797	----------	1,202	2	10,270	16
New Hampshire	----------	502	----------	55	----------	2,522	11
Vermont	1	631	----------	3	----------	6,335	10
Massachusetts	23	4,554	----------	----------	9	26,396	56
Rhode Island	----------	33	----------	12	1	6,661	7
Connecticut	7	2,408	3	167	2	19,129	51
Middle Atlantic	98	27,482	128	334	67	136,688	609
New York	55	14,809	128	[1] 78	37	52,055	233
New Jersey	22	9,457	----------	157	29	34,060	85
Pennsylvania	21	3,216	----------	99	1	50,573	291
East North Central	165	23,951	59	2,051	24	91,055	595
Ohio	1	3,387	1	95	6	21,389	168
Indiana	39	1,231	----------	355	5	4,028	40
Illinois	57	6,528	1	307	8	5,833	196
Michigan	54	7,153	57	115	2	20,279	120
Wisconsin	14	5,652	----------	1,179	3	39,526	71
West North Central	198	1,141	10	967	34	35,778	283
Minnesota	3	----------	7	25	30	3,355	71
Iowa	13	115	----------	----------	----------	2,243	34
Missouri	3	2	----------	145	4	8,044	92
North Dakota	125	----------	----------	295	----------	1,493	24
South Dakota	39	1	----------	4	----------	1,001	23
Nebraska	5	----------	1	302	----------	2,713	9
Kansas	10	1,023	2	196	----------	16,929	30
South Atlantic	51	2,427	11,585	25,154	459	84,451	438
Delaware	2	1	----------	1	----------	740	17
Maryland	5	1,106	----------	60	9	16,728	29
District of Columbia	----------	----------	----------	----------	1	2,248	20
Virginia	5	----------	----------	10,149	20	21,393	84
West Virginia	----------	728	----------	1,387	----------	3,637	58
North Carolina	4	----------	----------	----------	53	17,307	86
South Carolina	15	549	891	12,243	242	9,215	45
Georgia	11	----------	4,055	1,056	91	9,430	59
Florida	9	43	6,639	258	43	3,753	40
East South Central	37	1,306	3,389	5,328	262	30,229	436
Kentucky	6	950	71	265	21	8,401	159
Tennessee	17	300	10	1,950	35	8,236	146
Alabama	3	56	----------	3,113	134	11,343	79
Mississippi	11	----------	3,308	----------	72	2,249	52
West South Central	66	943	636	64,866	3,317	79,638	469
Arkansas	1	422	7	4,510	323	12,525	44
Louisiana	2	18	605	197	21	1,349	57
Oklahoma	15	503	24	2,040	92	7,508	52
Texas	48	----------	----------	58,119	2,881	58,256	316
Mountain	64	5,114	----------	6,026	24	27,216	125
Montana	5	1,679	----------	205	----------	3,806	14
Idaho	1	499	----------	516	2	2,912	7
Wyoming	3	264	----------	2	----------	549	9
Colorado	45	1,135	----------	1,099	4	7,314	53
New Mexico	3	169	----------	49	1	4,324	9
Arizona	4	893	----------	3,936	13	3,932	15
Utah	2	475	----------	77	2	3,548	5
Nevada	1	----------	----------	142	2	831	13
Pacific	67	20,978	----------	2,053	30	64,537	363
Washington	5	2,747	----------	1,259	1	12,661	61
Oregon	2	----------	----------	----------	----------	9,793	26
California	60	18,231	----------	794	29	42,083	276
Total 1949	781	92,267	15,810	108,218	4,231	620,905	3,469
Total 1948	575	18,287	16,260	165,805	9,797	613,810	3,375
Median 1944–48	667	29,222	16,104	443,339	47,894	613,810	5,602
Alaska	----------	125	----------	274	----------	627	2
Hawaii	----------	185	2	4,736	163	5,787	3
Panama Canal Zone	----------	7	----------	1	944	108	14
Puerto Rico	----------	----------	----------	19,748	353	380	----------
Virgin Islands	----------	----------	11	----------	----------	1	6

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[1] New York City only.

Reported Cases of Selected Communicable Diseases in the United States, Each Division and State, 1949—Continued

[Includes Territories and Possessions]

Division and State	Mumps	Pneumonia all forms	Poliomyelitis	Rheumatic fever	Rocky Mountain spotted fever	Scarlet fever	Septic sore throat
New England	29,675	3,339	3,478	72	----------	8,599	677
Maine	3,935	773	447	5	----------	553	55
New Hampshire	1,162	147	225	----------	----------	314	77
Vermont	2,722	58	153	----------	----------	224	12
Massachusetts	10,182	----------	1,805	----------	----------	6,057	96
Rhode Island	2.293	283	193	67	----------	375	31
Connecticut	9,381	2,078	655	----------	----------	1,076	406
Middle Atlantic	36,017	18,378	7,601	847	57	15,608	148
New York	11,849	11,362	5,241	----------	12	[2] 6,190	(2)
New Jersey	9,007	3,125	1,518	----------	16	3,234	148
Pennsylvania	15,161	3,891	842	847	29	6,184	----------
East North Central	42,319	10,259	9,873	1,154	32	25,456	1,703
Ohio	11,468	2,514	1,803	141	9	8,730	53
Indiana	1,500	540	1,150	20	9	1,900	62
Illinois	8,521	4,794	2,842	321	13	3,993	193
Michigan	7,349	2,066	2,914	672	1	8,852	1,149
Wisconsin	13,481	345	1,164	----------	----------	1,981	246
West North Central	12,105	2,937	6,717	115	13	4,964	211
Minnesota	----------	512	1,889	81	1	1,572	135
Iowa	3,386	83	1,221	4	5	814	27
Missouri	1,399	834	1,326	6	4	876	17
North Dakota	----------	669	451	11	----------	230	7
South Dakota	491	32	408	----------	2	121	5
Nebraska	2,618	99	681	2	----------	550	----------
Kansas	4,211	708	741	11	1	801	20
South Atlantic	12,119	12,482	1,967	408	258	6,039	6,663
Delaware	103	25	46	1	4	273	----------
Maryland	886	1,485	265	119	41	990	68
District of Columbia	315	659	105	----------	2	254	----------
Virginia	2,448	3,245	336	9	101	861	2,090
West Virginia	1,030	347	348	32	3	728	153
North Carolina	----------	----------	247	----------	82	1,730	36
South Carolina	3,007	4,178	110	176	8	271	3,975
Georgia	2,536	1,857	229	71	17	668	222
Florida	1,794	686	281	----------	----------	264	119
East South Central	6,062	7,672	1,847	229	67	4,413	387
Kentucky	2,373	1,409	695	48	20	1,785	96
Tennessee	2,344	2,762	541	110	33	1,653	291
Alabama	1,345	2,344	253	----------	11	668	----------
Mississippi	----------	1,157	358	71	3	307	----------
West South Central	20,410	20,877	4,890	149	45	1,990	6,544
Arkansas	1,711	2,352	994	10	14	174	1,310
Louisiana	628	1,485	228	37	1	180	22
Oklahoma	2,763	1,384	1,313	102	25	401	378
Texas	15,308	15,656	2,355	----------	5	1,235	4,834
Mountain	8,507	3,308	2,100	526	79	2,053	2,568
Montana	754	100	98	3	13	432	124
Idaho	1,357	321	510	36	7	213	503
Wyoming	675	186	120	97	20	158	1
Colorado	2,137	992	669	145	24	452	356
New Mexico	540	681	196	54	3	325	23
Arizona	1,439	821	180	138	----------	246	1,398
Utah	1,554	144	299	53	12	204	42
Nevada	51	63	28	----------	----------	23	121
Pacific	46,859	3,630	3,700	957	9	5,791	966
Washington	4,487	873	594	308	----------	1,652	152
Oregon	2,911	1,091	327	93	3	595	254
California	39,461	1,666	2,779	556	6	3,544	560
Total 1949	214,073	82,882	42,173	4,457	560	74,913	19,867
Year 1948	238,764	80,072	27,902	4,542	526	78,662	19,277
Median 1944–48	175,643	104,098	19,053	4,515	526	113,076	10,112
Alaska	508	49	1	17	----------	16	128
Hawaii	969	50	22	8	----------	13	10
Panama Canal Zone	72	199	[3] 14	----------	----------	1	1
Puerto Rico	456	----------	52	----------	----------	5	------
Virgin Islands	3	4	----------	----------	----------	----------	3

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[2] Cases reported as septic sore throat included with scarlet fever.
[3] Includes 6 nonresidents.

Reported Cases of Selected Communicable Diseases in the United States, Each Division and State, 1949—Continued

[Includes Territories and Possessions]

Division and State	Smallpox	Tetanus	Trachoma	Trichinosis	Tuberculosis, all forms	Tuberculosis, respiratory	Tularemia
New England	----------	23	5	51	5,689	5,292	2
Maine	----------	1	----------	2	[4] 522	451	----------
New Hampshire	----------	----------	----------	2	183	----------	----------
Vermont	----------	----------	----------	----------	405	405	----------
Massachusetts	----------	11	5	32	[4] 2,591	2,597	1
Rhode Island	----------	----------	----------	2	[4] 510	436	----------
Connecticut	----------	11	----------	13	[4] 1,478	1,403	1
Middle Atlantic	----------	47	1	171	22,245	13,563	16
New York	----------	27	----------	135	[4] 14,280	13,563	5
New Jersey	----------	12	----------	24	[4] 3,122	----------	1
Pennsylvania	----------	8	1	12	4,843	----------	10
East North Central	4	71	22	39	29,526	9,048	125
Ohio	2	10	1	24	[4] 11,021	----------	20
Indiana	----------	11	3	1	2,435	2,042	24
Illinois	----------	32	14	5	[4] 7,948	6,814	69
Michigan	1	18	1	9	5,953	----------	7
Wisconsin	1	----------	3	----------	2,169	192	5
West North Central	15	25	696	39	7,656	924	103
Minnesota	----------	10	----------	----------	[4] 2,565	----------	2
Iowa	----------	2	----------	37	[4] 903	----------	3
Missouri	8	5	579	----------	[4] 2,541	----------	86
North Dakota	----------	1	----------	----------	[4] 246	225	2
South Dakota	1	1	61	----------	307	31	----------
Nebraska	----------	----------	48	1	[4] 337	35	----------
Kansas	6	6	8	1	[4] 757	633	10
South Atlantic	2	145	3	8	21,664	16,578	306
Delaware	----------	----------	----------	----------	[4] 313	313	----------
Maryland	----------	12	----------	4	2,944	2,514	10
District of Columbia	----------	2	----------	2	[4] 1,591	----------	1
Virginia	----------	6	1	1	[4] 3,515	3,439	40
West Virginia	----------	----------	1	----------	[4] 2,482	2,432	6
North Carolina	2	----------	----------	----------	3,418	3,263	53
South Carolina	----------	23	----------	----------	[4] 1,372	----------	42
Georgia	----------	31	1	1	[4] 2,831	2,611	125
Florida	----------	71	----------	----------	[4] 3,198	2,006	29
East South Central	9	92	125	----------	13,071	4,461	143
Kentucky	6	5	117	----------	2,260	1,864	10
Tennessee	----------	27	8	----------	5,720	----------	66
Alabama	----------	36	----------	----------	[4] 2,624	----------	12
Mississippi	3	24	----------	----------	[4] 2,467	2,597	55
West South Central	13	59	319	11	13,078	6,930	403
Arkansas	----------	20	86	----------	2,216	2,192	212
Louisiana	1	31	----------	----------	[4] 2,606	2,521	44
Oklahoma	2	8	188	----------	[4] 2,392	2,217	74
Texas	10	----------	45	11	5,864	----------	73
Mountain	12	9	274	2	8,673	4,368	106
Montana	1	----------	1	----------	[4] 491	497	32
Idaho	3	2	1	----------	[4] 240	----------	1
Wyoming	----------	----------	2	----------	75	58	29
Colorado	2	1	2	1	[4] 3,658	----------	4
New Mexico	3	2	40	----------	1,429	1,361	2
Arizona	3	4	219	----------	[4] 2,432	2,261	3
Utah	----------	----------	2	1	[4] 235	191	34
Nevada	----------	----------	7	----------	[4] 113	----------	1
Pacific	1	51	20	21	12,010	9,188	14
Washington	----------	4	2	----------	2,155	----------	3
Oregon	----------	1	5	----------	[4] 787	732	5
California	1	46	13	21	9,068	8,456	6
Total 1949	56	522	1,465	342	133,612	70,352	1,218
Year 1948	56	522	2,202	461	144,300	73,266	1,093
Median 1944–48	345	470	1,618	357	128,927	70,056	1,093
Alaska	----------	----------	----------	----------	[4] 852	592	1
Hawaii	----------	3	1	2	[4] 743	525	----------
Panama Canal Zone	----------	12	----------	----------	35	----------	----------
Puerto Rico	----------	177	----------	----------	[4] 6,945	7,101	----------
Virgin Islands	----------	----------	----------	----------	[4] 11	5	----------

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[4] Figures from Public Health Service, Division of Tuberculosis.

Reported Cases of Selected Communicable Diseases in the United States, Each Division and State, 1949—Continued

[Includes Territories and Possessions]

Division and State	Typhoid fever	Paratyphoid fever [5]	Typhus fever endemic	Venereal diseases [6]			Whooping cough
				Syphilis	Gonorrhea	Other	
New England	67	145	1	4,681	4,049	47	7,779
Maine	14	4	----------	504	297	3	506
New Hampshire	1	----------	----------	182	78	----------	360
Vermont	2	2	----------	306	157	----------	317
Massachusetts	31	132	1	1,928	2,287	24	4,638
Rhode Island	2	3	----------	828	300	1	306
Connecticut	17	4	----------	933	930	19	1,652
Middle Atlantic	369	144	7	43,327	39,746	905	19,070
New York	122	90	3	25,302	23,901	666	8,712
New Jersey	39	19	1	7,795	4,449	42	4,524
Pennsylvania	208	35	3	10,230	11,396	197	5,834
East North Central	365	94	6	45,792	48,689	1,050	16,160
Ohio	159	16	----------	16,442	10,725	177	3,696
Indiana	47	7	----------	4,624	3,066	51	993
Illinois	98	2	3	13,823	24,776	415	3,946
Michigan	48	67	3	8,743	9,427	399	4,130
Wisconsin	13	2	----------	2,160	695	8	3,395
West North Central	176	39	----------	14,194	9,724	146	1,436
Minnesota	14	26	----------	1,129	940	----------	179
Iowa	5	4	----------	2,137	836	4	188
Missouri	115	3	----------	6,170	4,992	97	346
North Dakota	2	2	----------	244	159	1	155
South Dakota	7	1	----------	418	347	----------	51
Nebraska	13	----------	----------	1,282	1,007	31	121
Kansas	20	3	----------	2,814	1,443	13	396
South Atlantic	525	293	394	54,664	94,741	5,229	6,644
Delaware	9	----------	----------	810	216	9	228
Maryland	39	5	1	6,310	7,945	293	1,268
District of Columbia	15	15	----------	3,175	15,974	1,119	120
Virginia	117	32	3	5,260	10,751	289	1,377
West Virginia	75	6	----------	4,265	4,490	97	1,051
North Carolina	53	10	29	6,604	15,640	511	1,398
South Carolina	65	15	22	5,792	9,625	360	769
Georgia	100	60	216	10,127	15,004	1,282	242
Florida	52	150	123	12,321	15,096	1,269	191
East South Central	419	39	185	32,421	45,034	1,363	3,152
Kentucky	152	7	3	4,013	5,804	44	1,172
Tennessee	133	18	28	6,042	22,658	344	1,184
Alabama	56	11	142	10,461	5,560	304	522
Mississippi	78	3	12	11,905	11,012	671	274
West South Central	616	106	375	38,689	45,741	1,315	6,440
Arkansas	125	5	13	9,814	4,281	254	769
Louisiana	132	33	76	10,231	12,209	566	108
Oklahoma	74	9	2	3,634	5,796	96	222
Texas	285	59	284	15,010	23,455	399	5,341
Mountain	168	45	1	6,293	4,807	77	2,417
Montana	13	----------	----------	360	185	----------	105
Idaho	22	11	----------	214	315	14	141
Wyoming	6	4	----------	219	118	----------	37
Colorado	33	16	----------	1,095	1,471	19	359
New Mexico	51	3	1	1,329	858	19	200
Arizona	38	7	----------	1,981	1,119	12	562
Utah	4	3	----------	446	311	1	940
Nevada	1	1	----------	649	430	12	73
Pacific	137	407	14	16,130	25,040	935	6,279
Washington	5	23	----------	1,397	2,146	119	780
Oregon	15	3	----------	700	854	29	1,031
California	117	381	14	14,033	22,040	787	4,468
Total 1949	2,842	1,312	983	256,191	317,571	11,067	69,377
Total 1948	2,905	1,057	1,184	355,925	345,501	12,559	74,294
Median 1944-48	3,062	966	3,371	384,140	345,501	12,559	109,285
Alaska	1	----------	----------	240	687	1	5
Hawaii	3	----------	17	454	602	24	20
Panama Canal Zone	16	6	13	282	613	28	42
Puerto Rico	105	----------	44	6,817	8,299	100	3,097
Virgin Islands	----------	----------	----------	119	140	1	16

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[5] Includes cases reported as salmonellosis.
[6] Figures from Public Health Service, Division of Venereal Diseases.

Additional Communicable Diseases

Additional diseases reported by State health departments in 1949 and not shown in the table are given below.

Actinomycosis: Georgia 1, Michigan 2, Minnesota 3, Nevada 1, New Hampshire 1, New York 1, Pennsylvania 1, Rhode Island 1, South Dakota 2.

Anthrax: California 4, Illinois 1, Kansas 1, Massachusetts 3, Missouri 4, New Jersey 2, New Mexico 3, New York 26, Ohio 1, Oklahoma 1, Pennsylvania 16.

Blastomycosis: Indiana 1.

Botulism: California 2, Kentucky 7, Montana 1, New Jersey 1, New York 3, Oklahoma 1, Tennessee 1.

Cancer: Alabama 4,247, Arkansas 709, Colorado 3,316, Florida 3,646, Georgia 287, Idaho 604, Kansas 3,932, Kentucky 33, Louisiana 2,240, Montana 1,358, Nevada 9, New Mexico 719, North Dakota 602, Pennsylvania 7,996, South Carolina 689, Tennessee 3,669, Utah 384, Wyoming 477, Virgin Islands 9.

Chagas disease: Panama Canal Zone 2.

Coccidioidomycosis: Arizona 89, California 77, New Mexico 1.

Colorado tick fever: Colorado 117, Utah 3, Wyoming 2.

Dengue: Georgia 3, South Carolina 4, Texas 38.

Diarrhea of the newborn: California 61, Connecticut 5, Florida 142, Illinois 98, Indiana 3, Maine 1, Maryland 8, Michigan 110, Minnesota 18, New Jersey 1, New Mexico 40, New York 50, North Dakota 2, Ohio 171, Oklahoma 6, Pennsylvania 41, Utah 1, Washington 4, West Virginia 11.

Encephalitis (not specified as infectious): Colorado 19, Idaho 4, Kentucky 3, Maryland 6, Michigan 12, Montana 4, New Mexico 2, New York 1, Ohio 19, Rhode Island 11, Washington 1. (See also Encephalitis, infectious, in table.)

Erysipelas: Arizona 1, Arkansas 13, Colorado 21, Connecticut 25, Florida 22, Idaho 13, Illinois 174, Indiana 20, Iowa 5, Kansas 7, Kentucky 1, Louisiana 6, Maryland 3, Massachusetts 2, Michigan 98, Minnesota 4, Missouri 7, Montana 12, Nebraska 2, Nevada 1, New Mexico 3, North Dakota 7, Ohio 29, Oregon 55, Pennsylvania 45, South Dakota 3, Tennessee 27, Utah 4, Vermont 2, Washington 22, Wisconsin 51, Wyoming 3, Alaska 3, Hawaii 6, Puerto Rico 11.

Favus: Kansas 1, Kentucky 1, Michigan 1.

Filariasis: Nevada 1, Puerto Rico 27, Virgin Islands 12.

Food Poisoning: California 555, Colorado 3, Connecticut 14, Florida 3, Idaho 18, Illinois 412, Indiana 17, Iowa 13, Kansas 9, Louisiana 4, Maine 57, Minnesota 749, Montana 49, Nevada 31, New Jersey 25, New Mexico 11, New York 604, Ohio 35, Oklahoma 66, Oregon 38, Washington 142.

Histoplasmosis: Minnesota 1, Tennessee 4.

Impetigo contagiosa: Colorado 81, Connecticut 3, Idaho 75, Illinois 25, Indiana 30, Kansas 27, Kentucky 97, Maryland 2, Michigan 1,121, Missouri 21, Montana 22, Nevada 126, New York 208, North Dakota 18, Ohio 434, Rhode Island 2, Vermont 1, Washington 937, Wyoming 7, Alaska 35, Hawaii 60.

Jaundice (includes infectious hepatitis and Weil's disease): Arizona 5, California 559, Connecticut 13, Florida 4, Idaho 5, Illinois 39, Indiana 2, Kansas 1, Kentucky 22, Louisiana 2, Maine 16, Maryland 13, Michigan 35, Minnesota 21, Montana 18, Nevada 4, New Hampshire 1, New York 362, Ohio 2, Oregon 190, Pennsylvania 553, Rhode Island 17, South Carolina 5, Tennessee 39, Washington 15, Wyoming 8, Alaska 2, Hawaii 19, Panama Canal Zone 34, Puerto Rico 4.

Leprosy: Arizona 1, California 11, Illinois 1, Louisiana 1, Minnesota 1, Mississippi 1, New York City 15, Ohio 1, Texas 6, Hawaii 31, Panama Canal Zone 5, Puerto Rico 5.

Moniliasis: Minnesota 2.

Mononucleosis: Arizona 5, Connecticut 137, Idaho 24, Kentucky 15, Maryland 8, Michigan 142, Minnesota 415, Montana 3, Ohio 3, Oklahoma 9, Pennsylvania 3, South Carolina 41, Tennessee 40, Vermont 1, Washington 18.

Ophthalmia neonatorum: Arizona 4, Arkansas 3, California 11, Colorado 1, Connecticut 1, Florida 11, Illinois 152, Kentucky 2, Louisiana 6, Maryland 7, Massachusetts 160, Michigan 14, Mississippi 36, New Jersey 8, New Mexico 8, New York 25, Ohio 474, Oklahoma 3, Oregon 1, Pennsylvania 24, South Carolina 18, Tennessee 12, Texas 139, West Virginia 53, Wisconsin 4.

Pellagra: Alabama 19, Arizona 1, Arkansas 6, Georgia 68, Kansas 4, Louisiana 4, Maryland 1, New Mexico 2, Oklahoma 25, South Carolina 255, Tennessee 25, Virginia 6.

Plague: New Mexico 3, Hawaii 1.

Psittacosis: Alabama 1, California 12, Illinois 1, Maryland 2, Michigan 2, Minnesota 1, New York 1, Virginia 2, Washington 1.

"Q" fever: Arizona 1, Colorado 1, Idaho 6.

Rabies in man: California 1, Illinois 1, Kentucky 2, Louisiana 1, Mississippi 1, New Mexico 1, West Virginia 1.

Rabies in animals: Alabama 354, Arizona 9, Arkansas 100, California 151, Colorado 15, Connecticut 3, District of Columbia 1, Florida 49, Georgia 458, Illinois 70, Indiana 750, Iowa 250, Kansas 35, Kentucky 491, Louisiana 30, Massachusetts 1, Michigan 181, Minnesota 6, New Jersey 19, New Mexico 1, New York 494, Ohio 612, Oklahoma 144, Pennsylvania 45, South Carolina 176, Tennessee 26, Texas 1,019, Virginia 79, West Virginia 32, Wisconsin 15.

Rat bite fever: Georgia 1, Ohio 1, Oklahoma 1, Tennessee 3.

Relapsing fever: California 9, Nevada 1, Texas 25, Panama Canal Zone 4.

Rickettsialpox: New York City 108.

Ringworm of the scalp: Arkansas 3, Colorado 8, Connecticut 156, Florida 1, Georgia 206, Illinois 1,740, Indiana 148, Iowa 60, Kansas 37, Kentucky 821, Maryland 1, Minnesota 11, Missouri 16, Montana 5, Nevada 15, New Mexico 5, Ohio 243, Oklahoma 79, Oregon 112, South Carolina 6, Utah 126, Virginia 674, Wyoming 1, Alaska 5.

Scabies: Idaho 115, Indiana 13, Kansas 30, Kentucky 421, Maryland 3, Michigan 805, Missouri 23, Montana 42, Nebraska 1, Nevada 26, North Dakota 13, Ohio 134, Pennsylvania 303, Rhode Island 2, Vermont 5, Wyoming 16, Alaska 6.

Schistosomiasis: New York City 51, Puerto Rico 70, Virgin Islands 5.

Vincent's Infection: Colorado 84, Florida 97, Georgia 25, Idaho 49, Illinois 132, Indiana 14, Kansas 114, Kentucky 3, Maryland 10, Montana 6, Nebraska 462, Nevada 38, New Hampshire 20, North Dakota 31, Ohio 24, Oklahoma 278, Rhode Island 6, South Dakota 3, Tennessee 112, Utah 2, Vermont 29, Washington 155, Wyoming 5.

Yaws: Panama Canal Zone 28.

Yellow fever: Panama Canal Zone, 3 deaths.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APRIL 22, 1950

Influenza

For the fifth consecutive week reported cases of influenza in the Nation decreased from the preceding week. There were 7,395 cases reported for the current week as compared with 10,268 for the preceding week. This week's figure is slightly more than a fourth of the peak of 29,036 cases reported for the week ended March 18. The cumulative total of reported influenza cases for the first 16 weeks of the year is 224,863, which may be compared with the corresponding totals of 63,323 for 1949 and 278,753 for 1947, the highest during the last 5 years. The corresponding 5-year (1945–49) median is 127,745.

The following States reported relatively large increases in influenza cases for the current week over the preceding week: Colorado (18 to 39), Kentucky (224 to 328), Louisiana (3 to 19), Maine (6 to 27), Montana (58 to 370), Nebraska (0 to 48), New Hampshire (5 to 12), Washington (25 to 44), and Wisconsin (159 to 194).

Other Notifiable Diseases

Increases over the previous week were reported for diphtheria (107 to 110), measles (12,248 to 13,539), tularemia (16 to 18), and whooping cough (2,467 to 2,841). Diphtheria and measles remained below the 5-year (1945–49) medians of 184 and 27,438, respectively. The cumulative total of reported diphtheria cases for the first 16 weeks of the year is 2,343, compared with the corresponding 5-year median of 4,432; the cumulative total of measles is 133,101, compared with the corresponding 5-year median of 278,171.

Three cases of smallpox were reported, two in Iowa and one in Mississippi.

Decreases compared with the preceding week are indicated for the following diseases: Acute infectious encephalitis (24 to 16), acute poliomyelitis (62 to 60), meningococcal meningitis (104 to 91), pneumonia (2,348 to 2,216), scarlet fever (1,513 to 1,425), and typhoid and paratyphoid fever (39 to 37).

Telegraphic case reports from State health officers for the week ended April 22, 1950

[Leaders indicated that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	----	----	27	13	----	11	----	----	7	----	----	----	37	----
New Hampshire	----	----	12	----	----	2	----	----	----	----	----	----	----	----
Vermont	----	----	----	2	----	----	----	----	----	----	----	----	21	----
Massachusetts	3	----	----	335	2	----	----	----	131	----	----	1	111	----
Rhode Island	----	----	1	22	----	5	----	----	13	----	----	----	38	----
Connecticut	----	----	3	59	1	81	----	----	44	----	----	----	122	----
MIDDLE ATLANTIC														
New York	12	1	[2] 4	1,485	3	338	5	----	[3] 125	----	----	3	98	18
New Jersey	3	1	8	1,421	1	104	----	----	37	----	----	2	140	----
Pennsylvania	4	----	----	652	2	100	2	----	138	----	----	2	162	2
EAST NORTH CENTRAL														
Ohio	4	----	9	326	8	105	----	----	135	----	----	2	208	6
Indiana	3	----	1	479	2	5	----	----	63	----	1	----	36	[4] 30
Illinois	----	2	1	866	8	100	----	----	47	----	1	1	82	1
Michigan	2	3	3	1,500	8	52	1	----	144	----	----	2	176	4
Wisconsin	----	----	194	578	----	13	----	----	54	----	----	----	135	----
WEST NORTH CENTRAL														
Minnesota	4	----	12	163	5	8	1	----	19	----	----	----	61	1
Iowa	----	----	----	478	----	4	3	----	5	2	----	----	16	13
Missouri	1	----	16	32	4	16	----	----	10	----	----	3	13	----
North Dakota	----	2	34	2	2	7	----	----	3	----	----	----	1	----
South Dakota	----	1	----	37	1	----	----	----	1	----	----	----	10	----
Nebraska	----	----	48	138	----	11	1	----	29	----	----	----	3	----
Kansas	3	----	6	61	----	32	----	----	25	----	----	----	48	3
SOUTH ATLANTIC														
Delaware	----	----	----	10	1	----	----	----	1	----	----	1	5	----
Maryland	----	----	11	122	1	45	----	----	30	----	----	----	125	----
District of Columbia	----	----	2	85	----	68	----	----	5	----	----	----	----	----
Virginia	1	----	1,352	93	----	112	----	----	26	----	----	1	83	3
West Virginia	7	1	431	508	4	36	1	----	11	----	----	1	83	9
North Carolina	7	1	----	306	3	----	1	----	28	----	1	1	66	----
South Carolina	6	----	56	64	1	10	----	----	1	----	----	1	6	4
Georgia	4	----	55	75	2	21	----	----	10	----	----	----	12	6
Florida	5	----	6	192	2	21	3	----	7	----	----	----	8	----

See footnotes at end of table.

Telegraphic case reports from State health officers for the week ended April 22, 1950—Continued

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
EAST SOUTH CENTRAL														
Kentucky	1	----------	328	352	2	15	3	----------	14	----------	----------	1	72	14
Tennessee	3	1	104	178	1	----------	4	----------	14	----------	----------	2	129	4
Alabama	4	----------	263	110	2	96	----------	----------	6	----------	----------	----------	5	11
Mississippi	2	1	107	156	4	66	1	----------	4	1	4	1	1	----------
WEST SOUTH CENTRAL														
Arkansas	1	----------	711	90	3	65	----------	----------	5	----------	3	----------	69	2
Louisiana	2	----------	19	56	1	44	2	----------	10	----------	1	2	----------	----------
Oklahoma	3	----------	303	10	----------	49	----------	----------	10	----------	----------	1	11	3
Texas	8	1	2,606	917	8	427	18	----------	24	----------	6	5	267	25
MOUNTAIN														
Montana	1	----------	370	117	----------	----------	----------	----------	12	----------	----------	----------	7	----------
Idaho	----------	----------	53	21	----------	----------	1	----------	2	----------	----------	----------	23	----------
Wyoming	----------	----------	----------	61	----------	2	----------	----------	----------	----------	----------	----------	3	----------
Colorado	3	----------	39	69	----------	20	2	----------	11	----------	----------	1	17	4
New Mexico	----------	----------	5	37	----------	35	----------	----------	3	----------	----------	----------	36	----------
Arizona	----------	----------	99	144	----------	24	1	----------	38	----------	----------	----------	49	----------
Utah	----------	----------	5	290	1	3	2	----------	1	----------	1	----------	29	----------
Nevada	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------
PACIFIC														
Washington	----------	----------	44	76	1	7	----------	----------	38	----------	----------	----------	56	----------
Oregon	----------	----------	41	10	2	27	----------	----------	16	----------	----------	----------	31	----------
California	13	1	6	741	5	29	8	----------	68	----------	----------	3	130	----------
Total	110	16	7,395	13,539	91	2,216	60	----------	1,425	3	18	37	2,841	163
Median, 1945–49	184	8	1,691	27,438	97	----------	33	3	2,076	9	14	58	1,952	----------
Year to date 16 weeks	2,343	215	[5] 224,863	133,101	1,534	40,854	[6] 1,449	16	27,820	[6] 21	334	718	41,526	2,484
Median, 1945–49	4,432	126	127,745	278,171	1,425	----------	602	14	43,726	88	304	747	34,858	----------
Seasonal low week ends	(27th) July 9	----------	(30th) July 30	(35th) Sept. 3	(37th) Sept. 17	----------	(11th) Mar. 18	----------	(32d) Aug. 13	(35th) Sept. 3	----------	(11th) Mar. 18	(39th) Oct. 1	----------
Since seasonal low week	6,614	----------	[5] 255,393	152,231	2,447	----------	[6] 311	----------	44,259	[6] 41	----------	208	63,062	----------
Median, 1944–45 to 1948–49	11,998	----------	171,303	313,117	2,397	----------	156	----------	69,566	142	----------	274	61,295	----------

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[1] Including cases reported as salmonellosis. [2] New York City only. [3] Including cases reported as streptococcal sore throat. [4] Report for two weeks.

[5] Excludes 40,200 cases estimated by county health officers to have occurred in Kentucky during the period Jan. 1, to Apr. 8, 1950, and 4,000 cases estimated to have occurred in Jones County, Iowa.

[6] Arkansas: Deduction, smallpox week ended Mar. 4, 1 case. Addition, poliomyelitis, week ended Mar. 18, 1 case.

Alaska: Influenza 3, pneumonia 3, scarlet fever 2, typhoid fever 1, whooping cough 1.
Hawaii: Diphtheria 1, influenza 17, measles 3, pneumonia 1.

TERRITORIES AND POSSESSIONS

Puerto Rico

Notifiable diseases—4 weeks ended March 25, 1950.—Cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	156	Tuberculosis (all forms)	481
Diphtheria	21	Typhoid fever	3
Dysentery	2	Typhus fever (murine)	3
Influenza	52	Venereal diseases:	
Malaria	8	Gonorrhea	71
Measles	33	Syphilis	37
Poliomyelitis	5	Whooping cough	410
Tetanus	14		

DEATHS DURING WEEK ENDED APRIL 22, 1950

	Week ended Apr. 22, 1950	Corresponding week, 1949
Data for 93 large cities of the United States:		
Total deaths	9,701	9,801
Median for 3 prior years	9,458	
Total deaths, first 16 weeks of year	157,510	155,928
Deaths under 1 year of age	596	634
Median for 3 prior years	655	
Deaths under 1 year of age, first 16 weeks of year	9,972	10,487
Data from industrial insurance companies:		
Policies in force	69,820,005	70,482,786
Number of death claims	14,614	13,524
Death claims per 1,000 policies in force, annual rate	10.9	10.0
Death claims per 1,000 policies, first 16 weeks of year, annual rate	9.9	9.7

largest numbers of cases are as follows: Malleco 327, Concepcion 244, Talca 225, and Cautin 70. The city of Santiago reported 29 cases during the period March 26 to April 8.

England.—According to information received from London April 20, 1950, one suspected case of smallpox was landed at Liverpool on April 16, from a ship which had arrived from Bombay. The patient, a 5-year-old boy, was sent to the Port Isolation Hospital.

It was also stated that two suspected cases of this disease (one fatal) had been reported in Blackburn, Lancashire, during the period April 1–15. The patients were both children. No laboratory confirmation had been received at the time of the report.

India.—For the week ended April 15, 1950, Calcutta reported 313 cases of smallpox and Madras 133.

Typhus Fever

Afghanistan.—During the month of February 1950, Afghanistan reported 203 cases of typhus fever.

Yellow Fever

Bolivia.—Information from La Paz, dated April 5, 1950, states that the recent epidemic of yellow fever in Azero Province, Bolivia, has been reported under control and subsiding, but that a new outbreak has appeared in Nor Yungas Province, where, according to press reports, 25 cases with 10 deaths have occurred in the town of Coripata, and a few scattered cases in Irupana.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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Public Health Reports

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A Method of Home Care for Prolonged Illness

By Sidney Shindell, M. D.*

Caring for a patient in his home is, of course, not at all a new practice. Patients with various clinical conditions have always received some degree of medical attention in their homes. Some programs have been devised for giving home care to indigent patients as a supplement to hospital care (*1*).

Home care, as it has been developed at Montefiore Hospital and as proposed in recommendations here and abroad for more effective and economical care of patients, is a term used with a specific meaning. It connotes uninterrupted medical supervision and treatment through "extramural" services from the hospital when the patient can return to his own home and obtain as much or even more benefit from treatment than if he continued to occupy a hospital bed.

This concept of home care appeals to the public for many reasons. The most important, perhaps, is the need for a change in emphasis in medical practice to provide adequately for our aging population. The infectious diseases have only recently lost their preeminence as causes of death. Advances in medical technology have enabled most patients to survive at least their first encounter with the more common diseases. Consequently, effort is being directed to the possible solutions of the growing problems of long-term illness.

The costs of facilities and personnel necessary to hospitalize all these patients are rapidly becoming prohibitive. There appears to be no practical alternative to hospitalization other than some form of home care. Furthermore, it has been estimated that about 70 percent of those afflicted with a long-term illness can best be cared for at home, provided adequate supervision and assistance are available (*2*). A practical demonstration of a home-care program in Montefiore Hospital has been hailed as a partial solution to these growing problems and appears at first glance simple and universally applicable. In the words of the editorial staff of the American Journal of Public Health (3), this effort is an example of the concept of home care as a hospital function which "has perhaps never been developed with such completeness and success."

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The purpose of this report is in part to dispel the impression that the method is extremely simple in its execution and therefore to question its indiscriminate use, except where conditions are fairly ideal. "It is essential, however, to remember that its successful application depends on a high degree of hospital development in the fields of medical staff, social service, nursing, physical and occupational therapy. It would be most unfortunate if so fruitful a concept were to be discredited by wholesale displacement of patients by hospitals which lack the facilities to carry the program out successfully." (*3*)

This brief summary will not attempt to outline all the work and philosophy that went into the development of the program as it now operates. Invaluable material to aid in understanding the basic concepts can be found in the writings of Dr. E. M. Bluestone, Director of Montefiore Hospital (*4*, *5*, *6*, *7*) and Dr. Martin Cherkasky, Home Care Executive (*8*, *9*, *10*), through whose kind cooperation the following observations were made possible (*11*).

Summary of Underlying Philosophy

The rationale of caring for long-term illness in the home as well as in a hospital bed is based on many considerations—medical, social, and economic.

Medical Considerations

Many patients with long-term illnesses require the facilities of the present day hospital for only a small part of the time spent in the hospital bed. Too frequently patients who have had an adequate "work-up" become "maximum benefit" cases because of the present limitations of medical technology. These patients frequently occupy a hospital bed that is sorely needed by the community, and are too often neglected in the general hospital because of the greater demand for active care of the "acute" patients in other beds. To free the bed, a chronically ill patient may be sent home without provision for any after-care that may be needed. As a result, the patient is readmitted to the hospital when the family, unaided, cannot provide adequately for such after-care. Often the patient is much too ill to return for treatment in the out-patient department. Since this treatment is frequently the only care available, a patient may undergo great hardship to keep up his visits to the out-patient department for a brief period, and later falls back onto his own resources which are usually inadequate. These observations are not to be construed as criticism of either present in-patient or out-patient practices but merely points out a situation which exists in spite of the best care to be obtained in either of these facilities.

The points are raised to indicate a possible redefinition of the true position of the hospital as a center where patients must go when they need the immobile facilities for diagnosis and treatment available only in such a place. Patients should not occupy the resident facilities of the hospital when the medical and allied services can be easily transferred to an "extramural" setting.

Medically, then, the consideration motivating a system of home care is one of providing care to a patient during illness by utilizing the bed already available in his home, and the care which the family can give if shown the way. Furthermore, during a home visit from the hospital staff, the patient gets undivided attention. He does not have to compete with other patients as he does in the hospital or the out-patient department if he can visit the latter. In his home, the emotional factors contributing to his illness can be better evaluated and more appropriately solved. Instead of being separated from the environment in which he became ill, as is the case during hospitalization, the patient can be treated within his natural environment, and the influences of the latter on the illness can be viewed as accurately as any other finding. Home care, then, is not a replacement for either hospitalization or out-patient care, but bridges the gap between them. It serves the patient who cannot or should not get the treatment he needs in either of those services.

From the medical standpoint, a patient is suitable for home care when he meets the following conditions:

1. He must have had a complete medical evaluation of his disease, which is usually but not necessarily accomplished in a prior period of hospitalization.
2. His condition must be such that the therapy necessary for good medical care can be applied in the home. It is obvious that the patient's condition must also be such that out-patient care would not be satisfactory.

The limited knowledge presently available concerning home care makes outlining of more specific indications or criteria impractical. The staff's experience in caring for these patients in the home develops in them the judgment necessary to choose the appropriate case, judgment which is comparable to that necessary for the prescription of any medical or surgical technique.

For the first 2 years of operation at Montefiore, 261 patients have received home care. Of these, 177 had carcinoma and 84 had non-neoplastic illnesses. In the carcinoma group—which had some preference because of source of funds, accounting somewhat for the preponderance of cases—the type of lesions were: Breast, 46; lung, 25; rectum, 19; stomach, 16; cervix, 12; colon, 6; leukemia, 5; gall bladder, 4; laryngopharynx, 4; kidney, 3; uterus, 3; ovary, 2; tongue, 2; skin, 2; pancreas, 2; liver, 2; parotid, multiple myeloma, testis, bladder, thyroid, 1 each. In 19, the primary sites were uncommon or could not be accurately determined.

Of the non-neoplastic illnesses, there were 30 cases of cardiovascular disease, either arteriosclerotic or hypertensive, or both; 15 neurological lesions of various descriptions; 8 diabetes; 6 peripheral vascular disease; 5 rheumatic heart disease (now a separate program); 4 pulmonary tuberculosis; 3 arthritis; 3 ulcerative colitis; 2 bronchiectasis; 2 aortic aneurism; and 6 miscellaneous conditions.

Social Considerations

The patient at home "has not only the comfort of his own bed and the freedom of his own household regime; but a more personalized medical service when a doctor visits two or three times in his home than can be involved in the routine of ward rounds where attention is inevitably focused on new and critical cases." (*3*) He is spared contact with the misfortunes of others in adjoining beds in the hospital. He is once more a member of the family, participating in the operation of the household, in the family's social life, or in the plans for educating the children, rather than a mere patient in a numbered bed, waiting for his family to visit, frequently feeling rejected. Although he may have a relatively brief period of life expectancy, he can to a large extent maintain his customary family position at home—an all but impossible achievement while within the hospital walls.

Hence, in addition to the medical indications for home care, certain social conditions must also be fulfilled if the theoretical considerations are also to be practicable.

1. He must have a home with certain physical facilities—such as accessible bathroom, suitable bed space—which will make it possible for him to receive the care that may be necessary.
2. His family must be ready and able to assume the burden of care at home and must in many cases receive instruction on methods of making the home environment suitable. An attitude of discouragement within the home may be more devastating emotionally than dispassionate neglect in the hospital.
3. The patient must prefer to be at home and want to maintain his place as a member of his family group.
4. The patient and family must be able to establish reasonable rapport with the medical social worker or comparable person who is to help the family with its socio-economic problems.

When the criteria of the preceding section are combined with those stated above, it appears that the patient must be suitable for this type of care from both the social and medical standpoints. Home care is more than merely a means of emptying hospital beds; it is a specific method of care for a specific type of patient who, for optimal results, can best be cared for in the home. When the program operates effectively, no amount of hospital care could substitute for the personalized home care these patients receive.

Economic Considerations

Home-care programs now operating (*9, 12, 13*) have demonstrated that the actual cost of caring for a patient at home is one-third to one-fifth the cost of keeping the patient in the hospital. These studies are not complete, for adequate figures can be obtained only when full-scale programs are launched and adequate control series are available for comparison. At present, we can merely compare the average cost of hospitalization per patient-day and the average cost of home care per patient-day. It would be well also to study the actual cost of hospitalizing patients suitable for home care, readmission rates, periods when no hospitalization is given, and the like, to find the true cost of this method of providing long-term care. The relative length of time that home care is given these patients is one important factor that has not been studied adequately because the experiment, although successful, is not old enough for such conclusions.

Two significant items account for the probable difference between the costs of home care and hospitalization. One is the initial cost of facilities; the other is maintenance. Without some alternative method of caring for these patients, an expensive bed in an expensive hospital must be built, and nursing and maintenance personnel provided to operate this expensive facility. Housekeeping services, linen, laundry, food, etc., and the personnel who provide them are costly items. The cost of nursing care is reduced appreciably in home care although not eliminated. All these factors tend to indicate where the actual saving lies. Detailed cost break-downs must await comprehensive studies of all these factors, as well as extension of home care to an entire community, demonstrating its universal applicability.

Modus Operandi

Referral and Selection of the Patient

Since the first criterion for a patient to be acceptable for home care is a complete medical evaluation, the attending physician must initiate home care. If, in the opinion of the physicians responsible for inpatient care, the patient can no longer benefit from remaining in the hospital, the usual procedure is to have the pertinent information concerning the patient's medical condition presented to the physician in charge of the home-care program. These data are usually recorded on a standard referral form which includes such information as complete description of the diagnosis, the present status of the patient's capacity for attending to his own needs, and a statement of the medication received. After review of this information, the physician in charge sees the patient and reevaluates the medical condition in the light of his experience with the type of patient found to be suitable for home care. Should the medical condition warrant, a social service evaluation of the patient is then undertaken, using the criteria outlined previously.

If the patient meets the necessary social conditions and is accepted for home care, the house physician makes available a complete summary of the patient's illness (history, physical condition, laboratory findings, course in hospital, etc.) which becomes the basis on which the home-care chart is developed. The patient receives for use at home a supply of the medication he was receiving at the hospital. Discharge from the hospital is then arranged in the usual manner.

First Home Visit

Within 24 to 48 hours after discharge, the patient is visited by the physician in charge and the social worker, who view the patient within his home situation and thus have more conclusive impressions than those gained from seeing the patient and his home as detached entities. Problems which first appear at this point may require attention to make the patient actually "feel at home."

The physician then, already aware of the medical condition of the patient, checks his physical condition and prescribes the medication that will be necessary.

The needs for nursing care, housekeeping aid, dietitians, special equipment, physical therapy, and occupational therapy are evaluated, and appropriate services are arranged for the patient on recommendation of the home-care physician.

Subsequent Visits by Physicians

The physicians working on the program are then scheduled to see the patient at least once a week, sometimes more frequently, just as rounds are conducted in the hospital. Physical and laboratory examinations are made as may be deemed necessary by the visiting physician, and medications are prescribed. Consultations are recommended when necessary, utilizing the specialist staff at the hospital and paralleling procedures in the ward routine. One morning a week is usually devoted to "rounds" on problem cases by an attending staff physician. After each visit, a clinical note is made in the patient's chart, thus making the record readily available to the other home-care physicians and to the house physicians if and when readmission to the hospital is considered advisable.

On recommendation of the visiting physicians, the patient may be returned to the hospital on a priority basis for a short stay for staff conference, special laboratory studies, and the like. While receiving home care, the patient is considered to be in an "extramural" hospital bed with all the hospital's facilities readily available to him.

Visits to the patients are scheduled so that the physicians on the program see each patient periodically. If the patient prefers a particular physician, his wishes are complied with so far as practicable. A physician in rotation is always available for emergency call.

Visits of Auxiliary Personnel

On recommendation of the physician, a visiting nurse (either from the public health department or a voluntary agency such as Visiting Nurse Service) visits the patient. She gives bedside care, bed baths, enemas, and parenteral medication, and helps with such procedures as paracentesis, transfusion, and the like, in addition to dressings and any other nursing procedures deemed necessary. Probably one of the most important functions of the nurse is to educate a responsible member of the family to give the patient the care needed between visits. The nurse thus helps the family gain the understanding of the patient's condition that is essential to intelligent management of the case. She also has an opportunity to demonstrate the value of available community health services for other members of the family when conditions warrant.

The physical therapist and the occupational therapist apply their efforts to improving the patient's ability to care for himself physically and economically, in selected cases, on recommendation of the physician who evaluates the patient's ability to receive such services. Housekeeping aid is also arranged for if necessary to improve the patient's ability to care for himself or the family's ability to care for the patient.

The social service worker makes regular periodic visits to help with any problems which may arise.

In this manner, all resources available are placed at the disposal of the patient, necessitating, of course, close interagency working relationships.

Subsequent Status of the Patient

In the course of home care, the patient's condition may result in the following changes, though he may remain on home care with little change for long periods of time:

1. Hospitalization may be necessary at any time for special tests, therapies, conferences, and any number of other valid reasons.

2. The patient may improve sufficiently to receive care in the outpatient department and is then discharged from home care. Ultimately

he may recover sufficiently to require a minimum of follow-up care.

3. He, of course, may die at home or may be readmitted to the hospital before death.

Ideally the patient stays on home care only so long as he needs and can benefit from the home-care services.

Medical Records

A short description of the way in which the medical chart of the patient is kept will round out the discussion of the manner in which this program operates. It seems needless to discuss the many reasons why good records must be kept. However, as will appear from the following details as to what goes into the home-care patient's record, these charts resemble hospital records in all but minor details, and lend themselves to the same uses.

For the purpose of record keeping, the home-care record is a separate entity, while the patient's chart kept during his stay at the hospital is returned either to the record library or is retained in the file of the home-care department where it is available for ready reference. The hospital chart is summarized and a typewritten copy which contains as much pertinent information as is possible constitutes the main link between the hospital and the home insofar as continuity of care is concerned.

The referral form mentioned in the section on Referral and Selection of Patient is also in the home-care chart and is valuble in that it carries the recommendation of the attending physicians as to the extent of activity, type of medication, and the like, that the patient is tolerating, and is a guide to the type of regime on which the patient can be expected to continue. Since it also carries the initial general evaluation of the patient's condition by the supervising physician, it can be of value as a guide for future management.

After the first home visit, the physician starts his notes with an extensive statement similar to the admission note of a hospital patient. Subsequent physician's visits are followed by the usual type of progress note.

Social service evaluation and subsequent case work appear on a special social service form and contain all the pertinent information that will be necessary for an understanding of the social problems involved.

Nurses' notes are not made after each visit as is the custom in hospital charts where notes are entered many times a day. All cases on home care have an initial nurses' evaluation which is a complete description of the existing nursing problems with recommendations as to future care. For those cases which require extended nursing care, monthly evaluations are usually made on a standard interagency referral form in use in New York City for all similar "referrals."

Reports of laboratory work and X-ray studies are made on the forms in use in the hospital.

The patient has, then, a chart which resembles an out-patient department record or hospital ward record (except for the nurse's notes). These charts are kept in the home-care office, as they might be kept in the nurse's station, rather than at the patient's bedside. The charts may be carried with the visiting physician if he so desires on his visits but are returned at the end of each day for notes to be entered. All notes are dictated to a stenographer who types all the records, including the progress notes.

These records are made available to the hospital personnel when the patient is readmitted. They are returned to the home-care file when hospital activity on the individual patient ceases.

In addition, individual cards are kept on active cases. They carry a summary of the number of visits (and dates) of the various types of personnel, the equipment and transportation used, and similar data for use in cost accounting, etc.

Conclusions

"The philosophy behind the home-care movement is based on the fact that many chronically ill patients are now residing in general hospitals at considerable expense to themselves or the community when there is no real need for their remaining in the hospital. They remain there because no provision has been made in most communities to make conditions in the home acceptable for their continued care outside the hospital, nor has any provision been made to bring into the home some of the few hospital type of services that are needed for the continued care of the patient.

"Care in the home involves the assumption on the part of the patient's family of all of the domiciliary functions and costs, as well as a large percentage of the nursing functions and costs. It is in these categories that much of the savings occur.

"In addition to the economic advantages of the home-care plan, there are advantages that accrue to the patient from the very fact that he is convalescing in an environment with which he is familiar. Many of these home-care patients are well along in years. They have become accustomed to the home environment. They miss the home when they are ill. They feel better and do better when they are again permitted to return home." *(14)*

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Ideological Barriers to Effective Teaching By Health Workers

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Much of the emphasis in the past in health education has been on overcoming obstacles to learning on the part of the learner. These barriers, as evidenced by the number of articles written on motivation, selling, and knowing your community, are generally listed as language difficulties, illiteracy, customs, superstitions, and poorly organized communities.

Health workers, of course, should be constantly aware of these external barriers, but there are other barriers too that stand in the way of effective health teaching. These might be thought of as internal barriers, or when limited to the realm of ideas or concepts, ideological. It is, accordingly, with a few of those barriers that this article will deal. They are not the only internal barriers, nor are they necessarily the worst, but they are the ones that the health education consultant often observes in untrained persons trying their hand at the intricate job of teaching.

Barrier 1: *The belief that most people's living habits cannot be changed by educational means.* Health workers are, by no means, the only people who occasionally express the belief that mankind generally does not have sufficient intelligence to profit from teaching. School teachers also have been heard to complain that many of their pupils are "too dumb to learn."

The belief seems plausible enough when we recall the people we once knew in school who have since "fallen by the wayside." Does not the fact that only a few of those who started school with us in the first grade went to college prove that there will always be the uneducated many and the educated few? Don't intelligence tests bear out the conclusion that many people lack adequate capacity for learning?

Actually, intelligence tests classify only 1 percent of the people as "feeble-minded," and only 6 percent as "dull or feeble-minded." Nor is failure in school necessarily proof of inability to learn. Responsibility for nonlearning, it must be emphasized, rests upon the teacher fully as much as or more than upon the learner. The fact that a child in school does not learn may merely mean that he is not interested in learning at that time what some other person wishes him to learn.

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This same situation may occur also when health workers attempt to educate adults who are not ready to learn. Learner goals and readiness to learn are important aspects of the learning process for all learners, both young and old.

We frequently brand the person who has difficulty in memorizing isolated bits of knowledge and truths as a person unable to learn. Rote memory, however, has very little bearing on "ability to see situations clearly and act intelligently upon the information presented"—the only types of learning in health that are likely to lead to improved health practices.

Learning can, or course, be affected in a number of ways, but learning that stays with us is practically never isolated information memorized without understanding. If what we learn is to stay with us, we are told, it must be accompanied by a strong sense impression or emotional response; it must fit in with something we already know a little about; and it must satisfy a basic need that we ourselves recognize. Health workers should set the stage for this type of learning and should guide learners in understanding modern health concepts and in applying them to personal needs and community health goals.

Educators have recently come to recognize also the importance of emotional set in the learning process. Anything that disturbs the child's equilibrium, such as threat to security, desire for recognition or response, curtailment of experiences, can aid as well as interfere with his learning. Adults, too, can be disturbed by threats to their security and accordingly will change their habits "only when they can emotionally accept new beliefs and practices as psychologically equivalent to their old habits." (*1*)

But finding such psychological equivalents is no simple matter. It is tantamount to changing a whole cultural pattern (*2*), and it involves the acceptance of a new set of values which is likely to meet resistance if there is any suggestion of force.

Lewin suggests that new psychological equivalents will be accepted if the individual can be encouraged to belong to a group which accepts the new system of values and beliefs, or if the group to which he belongs accepts the new values. This feat can best be accomplished, he says, by encouraging the group to discover the facts themselves as a group. This is the basic principle underlying the community organization movement so strongly advocated by some health workers.

Learning may fail for a number of other reasons too. The teaching may be over the learner's head; it may be improperly motivated; and it may appear to be useless to the learner. Or the learner may have an emotional set or possess certain cultural traditions that block his ready acceptance of new ideas. Or again, the learner may not be ready to learn; he may lack the necessary experiential background. Until we have tried every conceivable way of helping him to help himself we cannot truthfully say that the learner, as an individual or group, is unable to profit from health education.

BARRIER 2: *The belief that anyone who knows his subject can teach it.* This belief is commonly held by college professors who cannot conceive that anyone who knows as much about a subject as they do cannot teach it. Teaching, to them, of course, means sharing with others what they know about the subject, and they usually view sharing as telling or lecturing.

It is not difficult to see how this belief persists in the schools of higher learning, for colleges, when they hire a new instructor, seldom ask whether he knows how to teach. The courses he has taken, the degrees he holds, and the articles he has written are the criteria used by most college executives. The need to stimulate learner interest, to provide incentives to thinking, to diagnose learning difficulties, to allow for individual differences is seldom considered by most college teachers; to them subject matter is the important thing, seldom the learner.

Most college students acquire considerable knowledge in spite of the "take it or leave it" attitude so prevalent in most colleges, but we cannot expect as much of the average adult. Health workers must do much more than peddle information; they must consider the average individual's problems and must have some idea of what takes place in his mind and in his emotional framework if they are to help him reach a higher level of healthful living.

Understanding the learning process and knowing how to guide it are by no means simple skills. Like medicine, surgery, engineering, or public relations, teaching is an art which can be acquired only through tedious, painstaking practice over a period of years. A teacher must have, as one writer says (*3*), "a facile and thorough knowledge of the materials of instruction. He must know equally the nature and importance of learners' interests, how the mind works in acquiring new materials; the effect of emotional states; effect of reproof, praise, and of a hundred other items dealing with teaching procedures." Such a view of teaching encompasses far more than the mere dissemination of facts. It recognizes also the importance of understanding the learner and the procedures for directing the learning process, two abilities that do not come automatically to those who merely know their subject matter, no matter how gifted they may be.

BARRIER 3: *The belief that the chief business of teaching is imparting information.* This belief is a corollary of barrier two. Those who "know their subject" think that they can teach it because they view teaching chiefly as a matter of imparting information. To them, the goal of learning is acquisition of knowledge. To know a lot is to be educated, they believe.

Melvin (*4*) says that "the break-down of education is the result of regarding knowledge as the goal of learning." He advises that "all learners, young and old, should be taught to act, to secure knowledge as they go."

Far too many schools still regard imparting knowledge as their chief goal. In such schools teaching is based on the assumption that people should learn the correct way to do things now so that when the occasion arises, they will be able to act appropriately. The weakness of this line of reasoning, however, is that the facts supposedly taught are not likely to be remembered when the time comes for their use, since they were presented as isolated fragments which are seldom remembered.

Psychologists tell us that we learn not what we see or hear alone but chiefly our responses to what we see or hear. It is therefore not to be expected that people will learn from information thrown at them. Assuredly, most people are unprepared to respond to much of the health information being broadcast indiscriminately for their acceptance.

Psychologists also tell us that learners must be ready to learn. Accordingly, indiscriminate dissemination of information is like sowing seed upon ground that has not been prepared to receive it. Also, if people fail to understand, or can see no use for, the information they hear, they will not respond to it or accept it and hence will not learn. Since the generally accepted primary goal of health education is to improve health practices, not merely to increase health knowledge, it is easy to see why the returns on certain publicity campaigns in the past have so often been disappointing.

Closely akin to disseminating health information is the practice of answering health questions or teaching "health principles." Even though health experts know what is good for the other fellow, the mere statements of health principles or of solutions to health problems cannot be expected to fit the other fellow's needs. Principles should be the outgrowth of experience and hence should be derived by the learner himself. One person's principles cannot be another's unless the latter, too, has weighed the evidence, gone through the same experience, and come up with the same reactions or conclusions. The aim of health teaching should be the same as for all good teaching—to help the learner discover material that he can adapt to his own needs, not the mere giving of ready-made answers. Subject matter, or more specifically health information, will be useful and meaningful only when it can serve the learner's need or purpose.

BARRIER 4: *The belief that teaching is mainly a matter of persuading people to do things which experts have decided are best for them.* Since many people have so long considered teaching as a manipulative process, where the teacher's job is to do something to or for the learner, many will be unable to understand why supersalesmanship should be viewed as a barrier to effective teaching. At times, of course, good salesmanship will be necessary to win support for some essential health measures. In some situations, persuasion and appeal to authority may have to preclude the learner's free choice of action. One should clearly recognize, however, that this is indoctrination, or propaganda as the case may be, and not education.

Progressive educators agree that the aim of education should be to help people develop independence in using source materials and in making decisions. Appeals to prejudice, tradition, emotion, or authority deprive learners of the opportunity to grow. In the absence of opportunity for and practice in thinking for themselves, they forfeit the chance to make increasingly more intelligent choices in their everyday living.

In teaching, Bode says (*5*) one must "help the learner cultivate the habit of relying on the foresight of consequences rather than on authority in guidance of conduct." If such is our goal, our task in health education is to help people see the connection between what they do and the good or bad health that results. Our job is to teach people to rely on themselves—rather than solely upon the say-so of the health expert. Ours is the job of emancipating people from a slavish reliance upon what the expert says and of helping them to make intelligent decisions, each in keeping with his ability, yet each within the permissive atmosphere of a free society.

Education, it must be admitted, is often a discouragingly slow process for getting many of the jobs of a health department done. But since the best in our society exalts the place of the common man over that of mere efficiency, it must of necessity frown upon practices in which, it is implied, the few have mastery over the many. For any continuous program of public health there can be no substitute for freedom of inquiry and independence in decision making.

BARRIER 5: *The belief that there is a one best method of teaching.* It is not difficult to see why people expect to find a single one best method of teaching, for we in America are always on the lookout for simpler ways to do our disagreeable chores. We have reduced much of what we do to push-button control. Why not teaching too? Why not a simple rule of thumb, or at least a set of simple rules? Or a bag of tricks? But, unfortunately, there is no formula by which health workers can teach and teach effectively without studying education. "Learning is not a simple, isolated, discrete process, and desirable learning cannot be achieved by the ABC procedure, rules, regulations that masquerade in its name." (*6*) Teaching cannot be reduced to a rule of thumb for the simple reason that learning is not a simple process.

It is, of course, a letdown to be told that teaching is like every other art, a complicated process which takes time and much effort to acquire. "But why," one might ask, "should there not be a best way to teach when we know that there is a best way of swabbing plates, taking water samples, sterilizing milk bottles, and laying out pictorial displays?" We may, of course, question whether there really is only one best way to do each of these tasks, but in each of these cases the performer manipulates an inanimate object or objects—something that stays put, that does not change its behavior pattern during the performance. In other words, it is entirely possible to develop a one best method for performing a task if the materials manipulated are static. Learners and the learning process, however, are dynamic. People are not the same at different times and places, and hence need a variety of approaches.

Teaching must of necessity always be a highly varied performance. The learner, in the first place, is seldom the same at different times, for he is an emotional as well as an intellectual creature. How many of us have emotions that never vary? Similarly the situation itself will vary from place to place and from time to time. Can we say that teaching a mother in a home is the same as teaching her at a clinic or in a prenatal class? Are the requirements of the person-to-person type of education the same as the classroom presentation or demonstration? Does the restaurant worker react the same way at the place of work as in a food handlers class? Do people react the same in groups as they do singly? Nor can the teacher claim to be unchangeable, for no matter how great the control she may think she has over her moods, she as well as her students change with different teaching situations.

There are many types of learning processes, and for that reason alone different methods should be used for each of the types. One writer lists them as perceptual, sensori-motor, problem solving, memorization, and appreciation (*3*). Health workers are chiefly interested in solving problems and in improving attitudes. Their efforts, accordingly, should be directed toward understanding the processes which will affect such learning.

"Half the errors of teaching," Melvin writes (*4*), "are due to the treatment of all activities by the same teaching procedure, or to the use of a teaching technique suitable for one kind of activity to direct another." Health workers often ride hobby horses too, as evidenced by those who would do all their educational work through community organizations, or by those who would gain their objectives by following the advertising fraternity and repeating and repeating continuously until the concept has become a commonplace.

Since the situation, the learner, and the teacher are never the same, teaching must of necessity be an art in which the ability "to adapt boldly, to invent and to create procedures to meet these ever-changing situations" (*3*) most needs cultivation. As in all other arts, proficiency comes not by imitating others but through experimenting with methods until the right one is found that fits the situation and can be expected to work again in similar circumstances.

BARRIER 6: *The belief that an adequate measure of teaching is what the learners know about the subject.* One who has not given much thought to the matter is likely to assume that if a person has succeeded in learning what is good for him he certainly will put the knowledge to use and hence improve his health practices. Workers in the field, however, especially doctors and nurses, often observe situations in which patients know the correct thing to do, yet do not act in accordance with what they know. In such instances, a test of knowledge assuredly does not tell us what action we may expect.

Advertisers have long known that people do not act upon knowledge alone and accordingly have compiled lists of what they consider to be the springs of human action. An appeal to any of them, they point out, will result in increased sales. They also say that whether people will do something or not is the result of one or more emotional drives,[1] whereas how they will do it will be determined by what they have learned about the way to do it. Thus, if the goal of some health activity is to get people to do something, we must recognize that people act, as one writer puts it, largely to satisfy needs, reduce tensions, or maintain equilibrium. Accordingly, teaching must attempt, while imparting concepts, to reach these springs of action (*7*).

The goal of the typical American school of the past has been limited to imparting knowledge, ideas, and principles and to developing certain skills and habits for future use. Examinations given in such schools have usually succeeded fairly well in determining the results of this rather limited goal. Modern schools, however, have taken a wider view of the learning process and have broken away from sole reliance upon examinations as a measure of learning. They include in their list of learning products at least three kinds: (*a*) facts, knowledge, understanding, ideas, methods, principles, causes; (*b*) skills and habits; and (*c*) attitudes and appreciations. Most of these products, it is easy to see, cannot be measured adequately by the traditional examination.

To measure these additional products of learning, so as to obtain qualitative data about the learner and what he has learned, progressive educators have turned to such descriptive measures as anecdotal records, inventories, scales, interviews, diaries, and so forth. Health workers, however, will probably not need such a wide variety of evaluation tools, but if our objectives[2] are to be broader than the mere imparting of authentic health information, we too will need to think in terms of evaluating more of the results that we achieve. Certainly no simple measure of the health concepts imparted can tell us about an individual's appreciation of the community's health services, about his understanding of the causes of disease, and his attitude toward the health agencies that operate in his community.

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[1] Dr. Shaffer points out that people do not act upon reason so much as sentiments, tensions, drives, motives and habits.—Laurance Shaffer, Psychology of Adjustment, Houghton Mifflin Co., 1936.

It should be clear by now that any evaluation of teaching should be based on the initial objectives of the teaching activity. If, for instance, one of our goals is "the stimulation of public action and individual participation in preventive health activities" (*8*), then an adequate measure of the results achieved, it would seem, should be an appraisal of how much individual participation in preventive health activities is now going on in the community as a result of our educational leadership. Or, on the other hand, if we think of health education as principally a process of growth in an individual by means of which he alters his behavior or changes his attitude toward health practices as a result of new experiences he has had (*9*), then our measuring rod should attempt to tell us whether behavior or attitudes have changed and how much.

Assuming that the goal of a specific health project is to have expectant mothers see a doctor early in pregnancy, it will make little or no difference whether a mother knows she should go to the doctor early if she doesn't actually go. Similarly, if the health worker's goal is to alter the behavior of a food handler or change a prominent citizen's attitude toward the health program, success in imparting information will not fulfill entirely the objectives set. The only truly adequate measure of health teaching is not what a person knows or is able to do but what he actually does. To state the matter in a more colorful manner, as one writer once did (*10*), "the real test of health education is not how attractive are the hook and worm, but how many fish are caught; not how varied or fancy the sales techniques, but how many people bought the product for themselves, and are so satisfied that they tell their neighbors the good news."

There is danger, however, that, in our insistence on performance as the only adequate measure of successful teaching, we may lose sight of the fact that health workers are seldom in a position to measure the end product. Much of what is done in health work blossoms forth only at some later date. The success of a chest X-ray campaign, for instance, is not solely the result of the present educational drive, but the culmination of years of continued and consistent publicity and education.

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[2] "What Is Health Education" (symposium in the June 1947 issue of American Journal of Public Health) indicates among others the following objectives given by 14 leading health educators in the country: altered behavior, changed attitudes, increased citizen participation, public support, social action, radiant health, greater understanding, provision for learning experiences, dissemination of authentic information, better personal habits, utilization of the benefits of modern medicine;

We must recognize, therefore, that much of the evaluation of health teaching must be of a symptomatic or presumptive sort, like that of a sanitarian when he samples the city's water supply. The sanitarian presumes—and the rest of us are willing to accept his presumption—that all the water we drink from a given source is as pure as, or differs only slightly from, the sample taken. Health education needs a sampling system too!

The final proof of successful education, it would seem, must be based on a number of evidences of learning, all of which can be determined, as Nyswander (*9*) has pointed out, by studying current records, through self-evaluation schedules, inventories, polls, and surveys. And although no one test of the end product of educational endeavor is an adequate measure of the quality of teaching, the nearest approach to an adequate measure will probably always be an evaluation of success in extending opportunities for growth among those who are being taught.

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Rapid Measurement of Carbohydrate in Blood

—Preliminary Report—

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Measurement of the blood sugar is a frequent procedure in clinical laboratories but, from the standpoint of accuracy, perhaps one of the least satisfying to the clinical chemist. The fact that no known specific reaction is suitable for routine quantitative measurement of glucose necessitates the use of the nonspecific property of reduction. Since considerable amounts of noncarbohydrate material contribute to the reducing capacity of blood filtrates as they are frequently prepared (*1*, *2*), there have been many attempts to increase the specificity of method. These attempts have logically taken two directions: (1) Investigation of deproteinizing agents which should remove from the blood filtrate most or all of the interfering substances (*3*, *4*); (2) search for a chemical which will react only with glucose and be unaffected by other reducing materials present (*5*). The latter approach has resulted in an unusually simple blood sugar method which will be described.

Anthrone has long been used as an analytical reagent for glycerol with which it forms a reddish-orange complex. Dreywood (*6*), in 1946, found that a highly specific color reaction was produced by anthrone in sulfuric acid with carbohydrate solutions and suggested it as a qualitative test for carbohydrate material. He examined 18 carbohydrates and found that all of them gave a positive test. They included cellulose, starch, dextrin, glucose, arabinose, gum arabic, ethyl cellulose, and cellulose acetate. Negative tests were obtained for a large group of noncarbohydrates, including a variety of organic acids, aldehydes, ketones, phenols, fats, proteins, and synthetic noncellulose resins. The only noncarbohydrate tested which gave the reaction was furfural, but its behavior was not typical since the green color was rapidly replaced by the formation of a brown precipitate. Dreywood found the anthrone reagent to be about 40 times more sensitive than iodine in the detection of starch. As little as 1 part of starch in 900,000 parts of water was reported to produce the characteristic color.

Morris (*7*) adapted the anthrone reaction to the quantitative deter-

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mination of carbohydrates, using a 0.2 percent solution in 95 percent sulfuric acid. The addition of two volumes of reagent to one volume of a carbohydrate solution produced a green color which, after standing 10 minutes, could be read in a photoelectric colorimeter provided with a 620 millimicron light filter. A straight-line relationship was found between intensity of resulting colors and increasing amounts of glucose.

We found this simple reaction applicable to the determination of blood sugar.

Reagents and Apparatus

1. Reagents:

(a) Deproteinizing reagents such as N/12 sulfuric acid and 10 percent sodium tungstate (*1*), or 5 percent trichloracetic acid, or others (*3*, *4*).

(b) Anthrone reagent: 0.2 percent anthrone in 95 percent sulfuric acid.[1]

(c) Standard solutions of glucose ranging between 5 and 20 mg. percent.

2. Apparatus:

(a) Standard equipment for making blood filtrates (flasks, funnels, filter paper, etc.; or centrifuge).

(b) 25 x 250 mm. pyrex test tubes, or Evelyn photoelectric colorimeter tubes.

(c) Glass stopcock burette, 50 to 100 ml. capacity, with a large orifice (broken tip) for delivery of anthrone reagent (high viscosity).

(d) Spectrophotometer or photoelectric colorimeter provided with a 620 millimicron filter (Evelyn was used by the authors).

Procedure

Five milliliters of a blood filtrate representing a fiftyfold dilution of blood (e. g., 1 ml. of Folin-Wu filtrate plus 4 ml. of water) are placed in a pyrex test tube (or Evelyn tube); 10 ml. of anthrone reagent are added from the burette. The contents of the tube are mixed by swirling, and allowed to stand 15 minutes or more. A blank containing distilled water instead of blood filtrate, and at least one glucose standard (containing 0.1 mg. of glucose in 5 ml. of water) are prepared at the same time. Colorimetric reading by the usual technique follows.

The volume of unknown solution (diluted filtrate) employed may be varied to suit any particular measuring instrument. The single requirement is that no less than twice the volume of anthrone reagent be added; otherwise turbidity may occur due to precipitation of anthrone. Since the addition of anthrone reagent to aqueous solutions results in the generation of considerable heat, the test tubes employed for the reaction should be large enough to offer a cold upper portion to grasp for shaking, and should be of hard glass.

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[1] Anthrone may be purchased commercially (National Biochemical Company, 3106 Lake Street, Chicago 12, Ill.) or prepared by the method of Meyer (8). Ninety-five percent sulfuric acid is prepared by cautious addition of 950 ml. of pure concentrated sulfuric acid to 50 ml. of distilled water. The anthrone reagent tends to darken on standing. Hence, it should be prepared in rather small batches, about one liter at a time, kept in the refrigerator, and one or more standards should be run with each group of unknowns. The purer the sulfuric acid used, the less color the reagent has initially, and the better it will keep.

Following the 15-minute period of color development, the color is stable for many days, as checked spectrophotometrically, provided the solutions are stoppered and refrigerated. Solutions which have been shaken in contact with rubber are much less stable.

Caution is imperative for the operator in handling the anthrone reagent because of the concentrated sulfuric acid in it. Disposal of the latter may be accomplished by diluting it with large amounts of water and flushing it down the drain. Even when many determinations are carried out as in a screening project, the same procedure can be followed successfully with the use of a lead-lined sink in which to effect the dilution. An attempt to reduce the acid concentration by means of marble chips placed in the lead-lined sink proved to be unsuccessful because the carbonate particles soon became coated with calcium sulfate and thus inactivated.

Results

In exploring the feasibility of this procedure, it was necessary to study the influence of the common deproteinizing agents on the anthrone reaction. It was readily determined that filtrates prepared by the use of trichloracetic acid (four volumes of a 5 percent solution to one volume of blood), of tungstic acid (*1*, *2*), or of a barium hydroxide-zinc chloride combination (*3*) yielded essentially the same glucose value when subjected to the anthrone procedure as outlined, suggesting that noncarbohydrate reducing substances play no role in the color reaction.

The accuracy of the method was tested in two ways, by means of recovery experiments and by correlation with a standard procedure:

1. Varying but known amounts of glucose were added to several aliquots of blood except to one which served as the control.

Blood Glucose Recovery Experiments

Tube	*Glucose added (mg.)*	*Glucose recovered (percent)*
1	0	------
2	20	101. 35
3	40	98. 43
4	60	99. 00
5	80	97. 94

The last column in the table represents an average from 6 series of recovery experiments, each determination in which was run in duplicate.

2. A series of 125 blood samples was analyzed both by the Nelson-Somogyi (*3*) technique and by the anthrone procedure. Averages for the entire series were as follows:

Nelson-Somogyi		Anthrone
	Mg. per 100 ml.	
116.6±3.82*		118.4±3.59*

*Standard error of the mean.

Thus the proposed method fulfills at least two criteria for an acceptable quantitative procedure: It allows the practically complete recovery of glucose added to blood specimens; and it gives results comparable with those obtained by the use of a standard and generally accepted method.

Comment and Conclusions

It has been suggested (*9*) that color formation in this procedure depends on the intermediate formation of furfural. We concur to the extent that we believe only those compounds which in the presence of concentrated sulfuric acid give rise to furfural or a substituted furfural yield the color reaction. Such carbohydrate derivatives as glucosamine and glucuronic acid produce no color. Experimental evidence in support of the above statement, as well as of the dependability of the method, will be summarized elsewhere.

The following advantages appear to be obvious:

1. Following deproteination, a single easily prepared reagent is used.
2. A minimum of equipment is required and there is no period of heating (necessary in all routine blood sugar methods).
3. Sufficient blood can readily be obtained by fingertip puncture.
4. The reaction is unaffected by noncarbohydrate materials occurring in blood.
5. The results obtained are in close agreement with an accepted method.

Disadvantages lie in the handling and disposal of concentrated sulfuric acid and in the sensitivity of the color reaction. If glassware is not kept scrupulously free from contaminating carbohydrates such as lint, dust, and filter-paper fibers, erroneously high figures may be obtained. The fact that anthrone reacts with carbohydrates other than glucose would seem to be of little importance in view of the satisfactory correlation with the Nelson-Somogyi procedure.

On the whole, the described method represents a rare combination of ease and rapidity of operation with high precision in results. This should make it uniquely suitable not only for many clinical and experimental purposes, but especially for large-scale screening projects in which speed and economy are of major importance.

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(*9*) Sattler, L. and Zerban, F. W.: The Dreywood anthrone reaction as affected by carbohydrate structure. Science **108**:207 (1948).

Erratum

Q Fever Studies in Southern California. IX. Isolation of Q fever from parturient placentas of naturally infected dairy cows. Public Health Reports **65**: 541 (April 21) 1950.

The first sentence should read: "Epidemiological studies of Q fever infections in southern California among dairy and other livestock workers and residents near dairies have shown that factors other than the personal or household use of raw milk are required to explain these infections."

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APRIL 29, 1950

Influenza

For the sixth consecutive week reported cases of influenza in the Nation decreased from the preceding week. There were 5,548 cases reported for this week as compared with 7,395 for the preceding week. For the corresponding week last year 2,074 cases were reported. The 5-year (1945–49) median is 1,594. The cumulative total of influenza cases reported during the first 17 weeks of this year is 230,411 cases as compared with 65,397 for the corresponding period last year and the 5-year median of 129,178. Of the total cases of influenza reported this year, 100,153 were reported in Texas and 45,822 in Virginia.

For the current week reported cases of influenza decreased over the preceding week in all geographic divisions, with one exception. In the East North Central division, reported cases increased from 208 for the preceding week to 389. Of the five States in this division, Wisconsin reported the largest increase, from 194 to 350 cases.

Other Reportable Communicable Diseases

Reported cases of whooping cough totaled 2,984 for the current week as compared with the 2,841 cases reported the preceding week. The 5-year median is 1,913 cases. For the first 17 weeks of this year a cumulative total of 44,419 cases has been reported as compared with 16,961 reported for the corresponding period of 1949. The corresponding 5-year median is 36,738 cases.

A total of 1,468 cases of scarlet fever was reported for the week as compared with 1,425 last week, 1,988 for the corresponding period last year, and a 5-year median of 2,080. The cumulative total of scarlet fever cases for 17 weeks of this year is 29,288.

No cases of anthrax or smallpox were reported in the United States. There were 161 cases of rabies in animals reported in 20 States with the largest number of cases reported in Texas (31), New York (25), and Indiana (16). The cumulative total for 17 weeks of the year is 2,645 as compared with 2,249 for the corresponding period of 1949.

Telegraphic case reports from State health officers for week ended April 29, 1950

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	-----	-----	19	24	2	31	-----	-----	8	-----	-----	-----	32	-----
New Hampshire	-----	-----	4	-----	-----	2	-----	-----	4	-----	-----	-----	-----	-----
Vermont	-----	-----	-----	2	-----	-----	-----	-----	-----	-----	-----	-----	32	-----
Massachusetts	7	-----	-----	673	1	-----	-----	-----	161	-----	-----	5	174	-----
Rhode Island	1	-----	1	19	1	7	-----	-----	9	-----	-----	-----	49	-----
Connecticut	-----	-----	5	105	-----	44	1	-----	28	-----	-----	1	93	-----
MIDDLE ATLANTIC														
New York	6	3	[2] 3	1,545	8	307	2	-----	[3] 141	-----	-----	2	151	25
New Jersey	-----	-----	5	1,150	1	79	-----	-----	40	-----	-----	-----	131	-----
Pennsylvania	10	-----	-----	638	3	97	3	-----	115	-----	-----	1	162	1
EAST NORTH CENTRAL														
Ohio	4	-----	14	491	4	123	-----	-----	211	-----	-----	1	232	9
Indiana	23	-----	7	135	1	23	-----	-----	18	-----	1	-----	21	16
Illinois	-----	-----	3	780	4	78	-----	-----	53	-----	1	1	70	1
Michigan	2	1	15	1,266	2	52	-----	-----	121	-----	-----	2	176	9
Wisconsin	-----	-----	350	735	3	18	-----	-----	61	-----	-----	-----	147	-----
WEST NORTH CENTRAL														
Minnesota	-----	-----	5	221	-----	7	1	-----	15	-----	-----	-----	50	-----
Iowa	-----	-----	-----	482	1	5	-----	-----	2	-----	-----	-----	11	5
Missouri	1	-----	55	57	6	33	-----	-----	19	-----	-----	-----	21	-----
North Dakota	-----	-----	28	10	1	29	-----	-----	14	-----	-----	-----	3	-----
South Dakota	1	-----	-----	22	-----	1	-----	-----	3	-----	-----	-----	10	-----
Nebraska	-----	-----	-----	243	-----	-----	3.	-----	17	-----	-----	1	6	-----
Kansas	1	-----	1	63	-----	9	1	-----	25	-----	-----	-----	11	-----
SOUTH ATLANTIC														
Delaware	-----	-----	-----	8	-----	-----	-----	-----	8	-----	-----	-----	26	-----
Maryland	2	-----	6	50	3	30	-----	-----	26	-----	-----	1	51	-----
District of Columbia	-----	-----	-----	61	-----	123	-----	-----	8	-----	-----	-----	5	-----
Virginia	4	-----	918	138	1	76	1	-----	12	-----	-----	2	69	6
West Virginia	4	-----	226	287	3	24	1	-----	11	-----	-----	-----	106	5
North Carolina	3	-----	-----	177	5	-----	1	-----	23	-----	-----	-----	48	-----
South Carolina	3	-----	33	100	2	16	-----	-----	2	-----	-----	-----	15	4
Georgia	1	-----	90	48	1	10	-----	-----	4	-----	1	-----	7	9
Florida	-----	-----	13	131	1	8	1	-----	2	-----	-----	1	11	-----

EAST SOUTH CENTRAL														
Kentucky	3	----	104	390	6	29	1	----	19	----	----	1	52	8
Tennessee	1	----	39	234	2	----	----	----	16	----	----	3	54	1
Alabama	4	----	352	81	3	59	----	----	4	----	----	2	29	8
Mississippi	8	----	53	110	1	38	3	----	----	----	1	3	4	4
WEST SOUTH CENTRAL														
Arkansas	2	----	628	246	4	26	1	----	3	----	1	2	120	5
Louisiana	----	----	1	13	2	31	1	1	5	----	1	----	2	----
Oklahoma	1	----	135	25	1	30	2	----	12	----	----	----	16	6
Texas	11	3	2,077	1,068	4	473	31	----	36	----	5	4	375	31
MOUNTAIN														
Montana	----	----	57	122	----	----	----	1	12	----	----	----	1	----
Idaho	----	----	34	39	----	----	1	----	1	----	----	----	26	----
Wyoming	----	----	2	32	----	6	----	----	1	----	----	----	3	----
Colorado	3	----	26	87	1	10	1	----	14	----	----	----	16	3
New Mexico	----	----	----	39	----	10	----	----	2	----	----	1	14	----
Arizona	----	----	170	63	----	23	2	----	22	----	----	----	43	----
Utah	----	----	8	331	----	3	----	----	1	----	1	----	14	----
Nevada	----	----	----	2	----	----	----	----	----	----	----	----	----	----
PACIFIC														
Washington	1	----	29	128	3	4	----	----	35	----	----	1	39	----
Oregon	----	----	24	19	1	46	----	----	12	----	----	2	30	----
California	9	2	8	573	1	28	11	----	112	----	----	4	226	5
Total	116	9	5,548	13,263	83	2,048	69	2	1,468	----	12	41	2,984	161
Median, 1945–49	201	9	1,594	28,426	92	----	47	6	2,080	5	14	57	1,913	----
Year to date 17 weeks	2,459	224	[4] 230,411	146,364	1,617	42,902	1,518	18	29,288	21	346	759	[5] 44,419	2,645
Median, 1945–49	4,633	138	129,178	306,597	1,517	----	649	18	45,714	102	315	799	36,738	----
Seasonal low week ends	(27th) July 9	----	(30th) July 30	(35th) Sept. 3	(37th) Sept. 17	----	(11th) Mar. 18	----	(32d) Aug. 13	(35th) Sept. 3	----	(11th) Mar. 18	(39th) Oct. 1	----
Since seasonal low week	6,730	----	[4] 260,941	165,494	3,530	----	380	----	45,727	41	----	249	[5] 65,955	----
Median, 1944–45 to 1948–49	12,199	----	172,736	341,543	2,489	----	183	----	71,646	156	----	326	64,127	----

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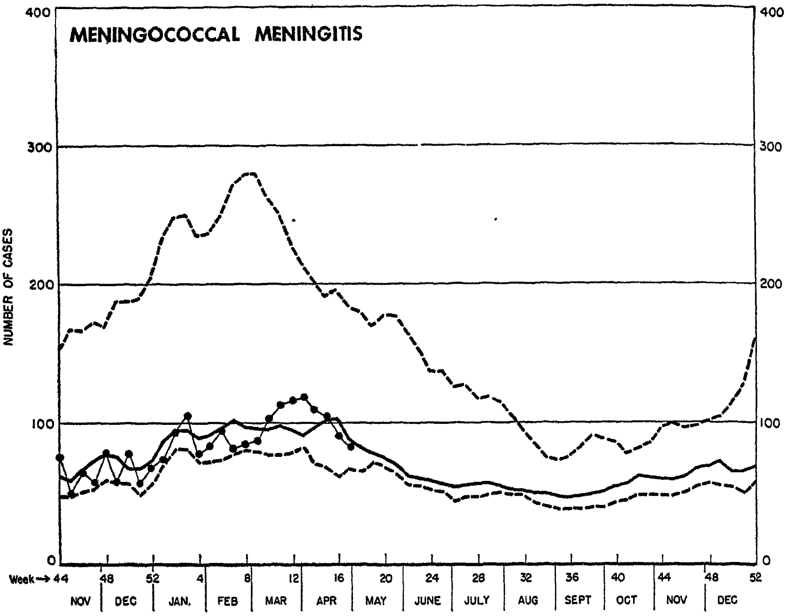
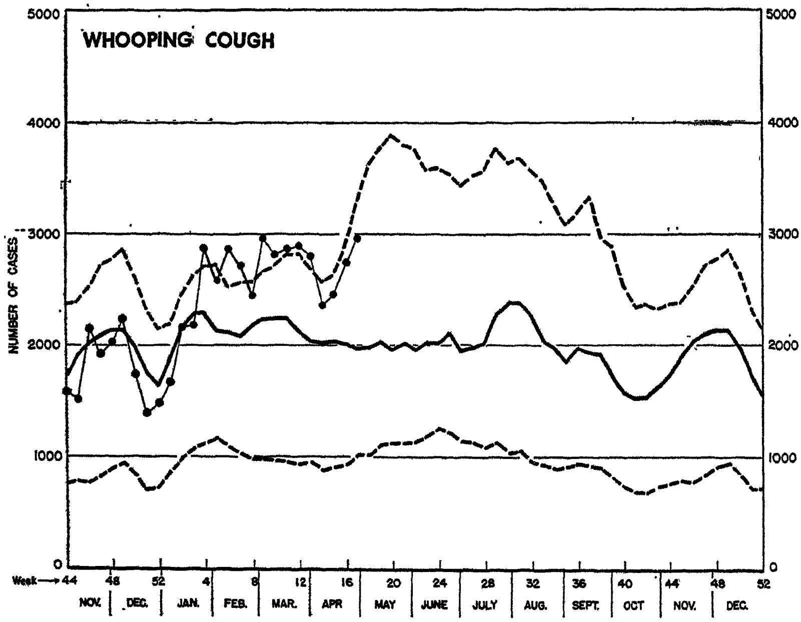
[1] Including cases reported as salmonellosis.
[2] New York City only.
[3] Including cases reported as streptococcal sore throat.
[4] Including 40,200 cases estimated by county health officers to have occurred in Kentucky during the period Jan. 1 to Apr. 8, 1950, and 4,000 cases estimated to have occurred in Jones County, Iowa.
[5] Deduction; Tennessee, week ended April 22, 91 cases.

Alaska: Influenza 6, pneumonia 4, scarlet fever 1.
Hawaii: Scarlet fever 1.

Communicable Disease Charts

All reporting States, November 1949 through April 29, 1950





The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 5 preceding years. The solid line is a median figure for the 5 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks, 1949-50

DEATHS DURING WEEK ENDED APRIL 29, 1950

	Week ended Apr. 29, 1950	Corresponding week, 1949
Data for 93 large cities of the United States:		
Total deaths	9,478	9,512
Median for 3 prior years	9,057	
Total deaths, first 17 weeks of year	167,635	166,039
Deaths under 1 year of age	627	661
Median for 3 prior years	686	
Deaths under 1 year of age, first 17 weeks of year	10,668	11,198
Data from industrial insurance companies:		
Policies in force	69,829,528	70,463,032
Number of death claims	14,784	14,126
Death claims per 1,000 policies in force, annual rate	11.0	10.5
Death claims per 1,000 policies, first 17 weeks of year, annual rate	10.0	9.7

FOREIGN REPORTS

ANGLO-EGYPTIAN SUDAN

Meningococcal meningitis.—The incidence of meningococcal meningitis continues to be high in Anglo-Egyptian Sudan. During the week ended April 15, 1950, 542 cases (64 deaths) were reported. The outbreak apparently is centered chiefly in Darfur Province, where 470 cases, 46 deaths, were reported for the week. Four hundred sixty-three cases with 69 deaths were reported in that Province during the preceding week.

CANADA

Provinces—Notifiable diseases—Weeks ended April 8 and 15, 1950.—Cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Week ended April 8, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis									1		1
Chickenpox	5		4		143	236	15	13	19	76	511
Diphtheria					4			1			5
Dysentery, bacillary						1				4	5
German measles			93		14	514	1	46	92	295	1,055
Influenza			15			27	2				44
Measles			2	9	313	588	25	56	34	135	1,162
Meningitis, meningococcal									1		1
Mumps			98		122	457	7	45	109	252	1,090
Poliomyelitis							1		1	1	3
Scarlet fever	4		2		54	18	5	3	47		133
Tuberculosis (all forms)	11		6	24	65	22	14	6			148
Typhoid and paratyphoid fever				3	3					3	9
Venereal diseases:											
Gonorrhea	4		8	11	87	41	22	15	33	39	260
Syphilis	4		3	2	71	22	1	9	2	10	124
Whooping cough	1		16	1	51	48	6	1		48	172

CANADA—Continued

Week ended April 15, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis							2	1			3
Chickenpox			12		270	226	57	11	27	110	713
Diphtheria					8	1	1	1	1		12
Dysentery, bacillary						1				1	2
Encephalitis, infectious						1					1
German measles			38		22	792		20	117	122	1,111
Influenza			6			60	8				74
Measles	1		1	8	646	547	93	20	31	94	1,441
Meningitis, meningococcal						1					1
Mumps			65		240	467	9	64	104	214	1,163
Scarlet fever	3		7		88	29	13	17	45	13	215
Tuberculosis (all forms)	11		4	27	95	40	30	7	99	48	361
Typhoid and paratyphoid fever	1		1		7	1				1	11
Venereal diseases:											
Gonorrhea			7	6	74	61	27	12	37	47	271
Syphilis	8		4	9	37	28	6	3	3	5	103
Whooping cough			3		132	71	3			10	219

CUBA

Habana—Notifiable diseases—4 weeks ended February 25, 1950.—Certain notifiable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox	4		Measles	2	
Diphtheria	12		Tuberculosis	12	1
Malaria	3		Typhoid fever	6	

Provinces—Notifiable diseases—4 weeks ended February 25, 1950.—Cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana[1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Brucellosis				1			1
Cancer	5	14	17	21	1	16	74
Chickenpox		4	2	2	3		11
Diphtheria	2	14	2	1			19
Leprosy		4		1			5
Malaria		3		1	4	25	33
Measles		3		17	1	11	32
Poliomyelitis		2		1	2	1	6
Scarlet fever						1	1
Tuberculosis	3	18	8	8	19	16	72
Typhoid fever	5	11	7	5	7	9	44
Whooping cough		20	2				22

[1] Includes the city of Habana.

EGYPT

Meningococcal meningitis.—For the period March 26 to April 15, 1950, 184 cases of meningococcal meningitis with 21 deaths were reported in Cairo, Egypt. A total of 70 cases (15 deaths) was reported in the rest of the country during the week ended April 8.

GERMANY (AMERICAN ZONE)

Q fever.—A new outbreak of Queensland fever (Q fever) has been reported in the American Occupied Zone of Germany. During the week ended March 18, 1950, 40 cases were reported in the Wurtemburg-Baden area.

INDOCHINA

Poliomyelitis.—During the month of March and the early part of April 1950, an outbreak of poliomyelitis was reported in the State of Tonkin, North Viet Nam, Indochina. Reported cases totaled 191 as of April 12. One hundred fifty-seven cases occurred in the port of Hanoi, and small numbers were reported in Haiduong, Hongay, and Haiphong. Only 11 deaths from the disease were reported during the period.

ISRAEL

Poliomyelitis.—A noticeable increase in the incidence of poliomyelitis has been reported in Israel. It is stated that between July 1948 and April 1949, the monthly notifications were at no time more than 3 cases, while during the period October 1949 to March 1950 the monthly figure rose from 15 to 39 cases.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India.—During the week ended April 22, 1950, 777 cases of cholera were reported in Calcutta.

Pakistan.—During the week ended April 15, 1950, 34 cases of cholera were reported in the port of Dacca.

Plague

Burma.—During the week ended March 25, 1950, one case of plague was reported in the seaport of Myaungmya.

China.—During the month of January 1950, 51 cases of plague with 23 deaths were reported in Fukien Province, and 17 cases, 15 deaths, were reported for the month of February.

Indochina.—During the week ended April 22, 1950, 4 cases of plague were reported in Phanthiet, Viet Nam, Indochina.

Smallpox

Chile.—In the current outbreak of smallpox in Chile, 1,904 cases had been reported up to April 18, 1950. The provinces reporting the largest numbers of cases are as follows: Malleco 836, Concepcion 409, Talca 365, Cautin 152. During the week ended April 15, 26 cases were reported in the city of Santiago.

China.—During the period March 19–April 22, 1950, 68 cases of smallpox were reported in Shanghai. Fifteen of these cases were reported for the week ended April 22.

Gold Coast.—According to information dated April 20, 1950, 20 cases of smallpox, with 4 deaths, had been reported in the port of Accra, and the outbreak was considered to be under control.

Indonesia.—During the week ended April 8, 1950, 38 cases of smallpox were reported in Jogjakarta, Java.

Palestine.—During the month of March 1950, 16 cases of smallpox were reported in Palestine, including 13 cases in Jericho, and one fatal case in Jerusalem.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

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Public Health Reports

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INCIDENCE OF DISEASE

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Public Health Reports

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The Evolution of a Psychiatric Program in Mississippi

By ESTELLE A. MAGIERA, M. D.,* T. A. WATTERS, M. D.,** and FELIX J. UNDERWOOD, M. D.*

In 1930, for the first time, a full realization of the utter lack of any psychiatric program in the Mississippi public health program and the urgent need for a beginning in this important branch of modern public health endeavor came upon us in sufficient force to cause some action to be taken. There were no funds available within or outside the State. Trained personnel was not available for employment and could not be obtained even on a loan basis.

No man, woman, or child in Mississippi could go to either of the two mental disease hospitals for examination, diagnosis, prognosis, advice, or referral without first being committed by law as an inmate. This condition has not been true of the Mississippi State Tuberculosis Sanatorium, under State Board of Health control, since its opening and dedication in 1916. The sanatorium conducts a fine out-patient clinic where any citizen can go at any time by appointment for a fee or not, depending on the financial circumstances of the citizen applying for diagnosis, without the necessity of being admitted to the institution.

No psychiatrists were available to conduct clinics for children or adults in cooperation with the State Board of Health and/or the mental disease hospitals. Indeed, there were no psychiatrists in private practice in the State. The staffs, medical and lay, of the two mental disease hospitals were political selections with few exceptions.

In this dark hour for the mentally ill and the potential future mental patients, we in Mississippi refused to accept a defeatist attitude. We decided to attempt to develop a state-wide child guidance program.

An experienced psychiatrist was employed by the Mississippi State Board of Health and given training as a public health medical officer.

---

*Director, Child Guidance Center, and Executive Officer, respectively, Mississippi State Board of Health, Jackson.

**New Orleans, La., formerly head of the Department of Psychiatry, Tulane University.

After obtaining her certificate in public health, she became assistant health officer, first in the city-county health department of Meridian, Lauderdale County, Mississippi, and then in Jackson, Hinds County. After the death of the director, she became full-time director of the city-county health department at Jackson. During the time spent in these general public health positions, cases were constantly referred to her by private physicians and the health officers, although organized work in psychiatry in the State had not begun.

Following a year's study at the Judge Baker Guidance Center, Boston, on a State Board of Health scholarship, she returned to Mississippi, accompanied by additional members for the first child guidance team in the State—the chief psychologist of 18 years' experience at Judge Baker Guidance Center, a well-trained psychiatric social worker, and a well-qualified secretary who had served several years as secretary to the superintendent and medical staff of a large mental disease hospital.

These trained workers immediately launched a twofold state-wide psychiatric program—educational and therapeutic. The team undertook a tremendous pioneering task. No preliminary psychiatric educational work had ever been done in the State, and it was necessary to break down the many prevailing superstitions and fears of the people. This educational work was done by interpreting the services of the team to health officers, public health nurses, school principals, social agencies, parent-teacher associations, juvenile court officials, and practicing physicians throughout the State. It was carried on simultaneously with the therapeutic program at the parent center in Jackson, and later in the five mobile clinics in the State. It was felt that, in addition to benefiting the patients, successful therapy would greatly assist in obtaining support for the program from the citizens of the State.

The beginning was made September 1, 1943, without any special appropriation from any source whatsoever, by using funds available through lapses in budgets, transfers, etc. These came, for the most part, from maternal- and child-health money allotted to the State by the United States Children's Bureau for general programs for mothers and children. A strong determination to succeed despite the lack of money was responsible for the accomplishments in the program.

Financially, the conduct and necessary expansion of the program in Mississippi, and perhaps other States with a similar problem, will be easier in the future. The procurement of properly trained personnel remains an obstacle to the desired and urgently needed expansion of the mental-health program. Well-trained psychiatrists with a knowledge and appreciation of the public health aspects of psychiatry and of public health generally are desirable and necessary for the success of a program. It is wise not to start a program until it can be developed and administered by capable personnel. In addition to the full-time personnel, top-flight consultants are necessary—consultants who will work and help get the job done and not limit their activities to occasional conversation and advice, as necessary as that is at times. Also, the State administrator must consider all programs and keep them in proper balance insofar as possible. However, a charge of overdevelopment in public health psychiatric programs anywhere in the country could have no justification at the present time; and it is only hoped that adequate financial support, sufficient numbers of trained personnel, and an intelligently receptive public will be forthcoming to insure the success of present and future programs.

No special Federal funds were available for Mississippi until the first Federal appropriation under the National Mental Health Act became available in July 1947. No State funds were made available for matching until July 1948. These funds, as yet, will permit only a minimum program in the State. However, a good start has been made within the limitations of funds and personnel, and it is hoped that all States will not let lack of funds and personnel keep them from beginning at least a small program in their health departments. With good team work and perseverance, the program can be expanded in time, despite severe limitations at the outset.

The great and urgent need for this preventive health service is evident from the many requests for service which cannot be filled because of lack of personnel and facilities. Mental health is of great importance to the citizens of all States, and mental illness is of real concern to us all. We have lagged behind in this particular part of our health work throughout the country for too long. With proper support we can have programs which can be as effective as the programs for malaria and typhus prevention and control, and venereal disease prevention and control. The results have been splendid in many of these other programs.

The importance of scientific training and teamwork in our efforts to prevent mental disease in the lives of so many of our people cannot be overstated. The whole team must work together with full sympathetic understanding, appreciation, and coordination of effort.

From the beginning of the program, we have realized that the efforts of many people would be needed to make the program a success. Two or three people certainly could not do all the work. Much has been accomplished with the teachers, through teacher workshops during the summer months, and they have helped a great deal. The health officers, public health nurses, health educators, the teachers, welfare workers, parents, ministers, and others have been, and will continue to be, most helpful, and it is believed that they, themselves, have received benefits from the program. Many physicians in the State, in addition to the medical health officers, now have a better understanding and appreciation of the program, and a desire to help in every way possible. Physicians now are referring most of the emotionally disturbed cases to the team, a practice they did not follow generally during the first year or two of the program. With each succeeding year, these physicians increasingly understand and appreciate the importance of referring emotionally disturbed cases as early as possible to the psychiatrist and her team. Many illustrated talks have been made before medical groups throughout the State, and they frequently ask for the appearance of psychiatrists on their local medical programs to discuss psychiatric disorders. Special symposia and seminars have been held for extern-clinicians in Jackson and at Tulane Universtiy in New Orleans with expenses of the physicians in attendance paid. In addition to these, a 2-week psychiatric institute was held in April 1949 for county health officers and supervising nurses at Gulfport and was sponsored jointly by the Commonwealth Fund and the State Boards of Health of Mississippi, Tennessee, Alabama, and Florida. The purpose was not to make psychiatrists in "six easy lessons," but rather to orient the health officers and nurses in the psychiatric concepts as related to a public health program.

From the outset our child guidance program was twofold in scope—educational and therapeutic—and the services consisted of only one team, psychiatrist, psychologist, and psychiatric social worker, until about a year ago. At the present time, the personnel consists of one full-time psychiatrist, three part-time psychiatrists, three psychologists, three social workers, two social workers in training, and one teacher being trained in remedial reading and speech pathology.

With the appropriation of Federal funds through the National Mental Health Act, the psychiatric services have been expanded since January 1948. In March 1948, a second team consisting of a well-trained psychologist and a psychiatric social worker was added. Recently a psychiatrist was employed to serve part time with this team. This group is based at Greenwood, Mississippi, and holds mobile clinics in Clarksdale, Cleveland, Greenville, and Tupelo. In December 1948, a third team consisting of a psychologist and a social worker was employed to serve the southern area. This team is based at Hattiesburg and holds clinics in Gulfport, McComb, Meridian, and Pascagoula. A psychiatrist gives part-time services to this team. Under the supervision of the psychiatrist, the psychiatric social workers in both of these centers have been trained to counsel parents and children presenting minor emotional disturbances. Children presenting serious emotional problems are treated by the part-time psychiatrist in the respective areas, or they are referred directly to the center in Jackson. The psychologists are doing consultation work with parents in an effort to utilize the parental influence and social environment of the child to strengthen his chances for recovery. The personnel of these clinics is supervised not only by the part-time psychiatrists, but also by the psychiatrist and director of child guidance in the State. The teams travel to headquarters in Jackson every 2 weeks for consultation. A copy of the complete case history on every child seen in the three therapeutic centers and all of the mobile clinics is kept on file in the Jackson office.

In each of the areas where mental health clinics are conducted, there are full-time, well-trained health educators, supervising nurses, and dental hygienists. Many of these key people have their Master of Public Health degrees and some psychiatric orientation.

After several years' experience, it is our considered judgment that we have traveled farther and faster along the psychiatric road in Mississippi by keeping psychiatry close to public health and medicine and at all times identified with them.

Psychiatrists are available to county health officers in an advisory capacity on education programs. The health officer gives mental hygiene service to patients on a superficial level. Staff conferences are held to discuss the mental hygiene concepts nurses and educators apply in everyday contact with the groups they serve.

Psychologists and social workers are available for advisory and consultant services on educational programs to the county health department personnel, to youth counselors, to principals and teachers, to juvenile courts, to welfare and other agencies interested in the welfare of children. The psychiatrists, psychologists, and psychiatric social workers give series of lectures to classes at Delta State Teacher's College (Cleveland), Millsaps College (Jackson), Mississippi College (Clinton), and Mississippi Southern College (Hattiesburg).

Mississippi now has a few certified psychiatrists in private practice, and two of these are associated on a part-time basis with the child guidance program. We plan to add two or more consultants on a part-time basis as soon as possible. With this set-up which will cover the State, with psychiatrists in private practice, and with teaching centers in New Orleans and Memphis, the gradual, and possibly rapid, development of an expanded program of mental health education and therapeutic services is proposed and will be achieved.

The routine procedure in the clinics calls for the child to be seen first by the psychologist to evaluate the child's intelligence, school achievement, and special abilities or lack of them. On this first visit the parent is interviewed by the social worker and a complete social history is obtained—birth and development, social relationships in the home, in the school, in the community, and a history of the problem presented. The child is then seen by the psychiatrist in an effort to discover the causative factors and motivations of his problem. This study may consist of a single diagnostic interview, or, if necessary, repeated therapeutic interviews. During the study and treatment of the child, the psychiatric social worker carries on the treatment of the parents. In all cases the parents are also interviewed briefly by the psychologist who gives the interpretation of the test findings.

Following a complete study of a case, the members of the staff report their findings and discuss all of the pertinent data at a staff conference. The psychiatrist then summarizes the case and recommends the plan of treatment for the child. In the mobile clinics these conferences are attended by principals, teachers, health officers, social workers and others who have dealt with the child, who are familiar with the history, and who will share in the responsibility of the treatment plan outlined at the conference.

Our referrals come from the schools, social agencies, parents, private physicians, and the county health department personnel. Health officers in Mississippi, after the psychiatric service has been interpreted to them, have invariably incorporated it in their over-all public health programs. Some of them are outstanding in their cooperativeness. Each child who comes to the center must have a complete physical examination, which is made either by the family physician or the county health officer. A record of the physical findings is brought in with the child on his first visit to the center in order to rule out any physical basis for the presenting problem.

The child guidance clinic is held in the respective county health departments with one exception. In Greenwood it was impossible to find quarters to house the child guidance team. The Junior League graciously offered to share their quarters in the city hall, which also houses the police department. Their offer was accepted in spite of the fact that we felt it was psychologically unsound. This view was vividly confirmed when a 9-year-old boy referred to the clinic came in with a toy pistol and expressed a great deal of fear that he might be apprehended by the police. The child guidance team will of necessity remain there until the new health department is completed and permanent quarters are available.

Mobile clinics are held one day a month. A monthly clinic, of course, is not ideal, but even at these long intervals we have carried children over a period of months with therapeutic success. When we have seen acutely upset children, the parents have been willing to bring them to Jackson for more frequent psychiatric interviews.

We have noted a spectacular growth in the nurses' ability to evaluate psychiatric implications in behavior problems of children. At one of our early staff conferences we discussed a case referred for thumb-sucking in which the mother had unwisely used an oatmeal box as a restraint. One of the staff nurses confessed saying, "It was I who recommended the oatmeal box as a restraint for that baby. Today, at least I have learned what *not* to do."

During the ensuing years, the public health nurses through participation in the educational program—institutes, lectures, staff conferences—have become more and more psychiatrically minded. Today the nurse is much more capable of evaluating emotional tone in the home, the parent-child relationship, and the emotional needs of the developing child. This is indeed evidenced by the steady improvement in the histories which the nurses prepare for the child guidance team in the mobile clinics.

Recently a nurse made the comment: "Attending a staff conference in which you discuss the social history, the psychological examination, and the psychiatric implications of the presenting problem is like an experiment in a laboratory to me. I see the practical application made of all of the theories which I have gleaned through my reading and through institutes and lectures."

Mississippi is primarily a rural State, and the county health departments form the foundation of the state-wide program. Each public health nurse is responsible for all the services in her particular area. The public health nurse knows families and has a positive working relationship with them. She sees the mother in the prenatal clinic and in some counties even assists at the delivery. The mother and child are seen by her after the child is born. She follows the child in the county health department through his immunizations and later during his school years. Due to this close contact, she has established a positive rapport not only with the mother, but with the family. She is in a unique position to give us valuable information regarding the emotional tone in the home and in the parent-child relationship. For this reason, nurses have been very helpful in keeping us informed of the progress of the cases seen in the clinic. In keeping with what Dr. Watters[1] said in addressing the National League of Nursing Education in 1939, our nurses have accepted the challenge of the disturbed personality and approach each patient as an individual and not as a number or automaton. Mississippi nurses certainly follow the Watters' dictum in doing their part to keep patients and their families from feeling any stigma of mental disease.

We have tried to gear our program to the community needs and available social resources. At times we have worked under great handicaps and under many adverse conditions. The child guidance program has had excellent acceptance and wholehearted cooperation. The demand for new clinics and services surpasses our ability to supply these needs. At the Greenwood clinic, we now have a waiting list of 30 patients and at the Jackson center, a waiting list of 40 patients. Yet we have many times felt utterly helpless in making satisfactory disposition of cases because of the lack of necessary professional services and very inadequate resources in the State. In the State, there are very few approved boarding homes certified to care for children. In the schools there are no facilities for remedial reading, notwithstanding the fact that we see many children with reading disabilities. We also see many children with speech defects who are in need of special training, but this service will not be available until the trainee who is on a State Board of Health scholarship studying remedial reading and speech pathology completes her course.

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[1] Watters, T. A.: Psychiatry in nursing education. Forty-fifth Annual Report of the National League of Nursing Education, 1939.

In only one community where we work is provision made in the school system for the child of below average ability. The public schools of Greenville provide an opportunity room for these children, while in Jackson, the capital and largest city in the State, there is no such facility. We find many children who are below average in intelligence and who are disciplinary and scholastic problems because they cannot compete with the average child for whom the curriculum is set up. The school authorities are cognizant of the need for special classes, but so far have not succeeded in adding these to the general public school system. Despite the lack of these facilities, school people cooperate wholeheartedly. Teachers make every effort to handle the individual cases in the best way possible in the regular classroom. Recently the psychiatrist and psychologist met with the superintendent of schools and the board of education, interpreted these needs to them, and outlined a program for the exceptional child. It was hoped that by the fall of 1949 this program would be added to the regular school curriculum.

We are repeatedly confronted with the problem of what is to be done with the defective child. The Institution for the Feeble-minded at Ellisville is only a custodial institution and has no facilities for a vocational training program for the higher grade defective. Furthermore, there are no private institutions for this type of child in Mississippi. In 1945, professional groups in the State made an intensive study and survey of the institution at Ellisville, and a comprehensive program has been outlined for a gradual reorganization to bring the institution up to the best possible modern standards. A good start has been made in this direction, and we hope that in the near future the institution will be able to offer to each inmate the greatest degree of vocational and educational training for which he is capable.

We have found it most disheartening that nowhere in the State is there a detention home for juvenile delinquents. No county or municipality maintains a suitable detention home for children awaiting hearings. Neither does any private institution or public agency caring for children make arrangements for temporary detention for the delinquent child. These young offenders must be kept in jail pending trial. The probation officers and juvenile judges are keenly aware of the inadequate resources for handling these young offenders and make every effort to segregate them from the adult prisoners and to make the best of a bad situation.

We are at a total loss in handling the feeble-minded Negro child as there are absolutely no facilities in the State. The Industrial School at Oakley for Negro males will not admit the feeble-minded child. Because of the crowded conditions there, it is almost impossible to admit any child to the institution.

The complete lack of such facilities and the many unmet needs of the children of the State have been repeatedly brought to the attention of the lawmakers. The awareness of these needs has given impetus to the organization of the Mississippi Children's Code Commission. In October 1945, Governor Thomas L. Bailey appointed to this commission 80 members representing the various public and private agencies in the State concerned with the promotion of the welfare of children. These people have assumed the following responsibilities: (1) to study the conditions in the State affecting the welfare of children and the laws pertaining thereto; (2) to make surveys of the facilities of the various agencies and institutions responsible for the care, control, and protection of children; (3) to recommend definite legislation for the establishment of minimum standards for the adequate care and protection of the children; and (4) to furnish educational and informational data obtained from the studies of the commission and report them to the Senate and House Committee on Child Welfare Legislation. The members of the commission have been zealous workers and have already made a contribution.

The Mississippi program, starting as it did on a "shoestring", has grown in spite of the many handicaps. Our hope and plan for the future is to have a psychiatric program available in every full-time county health department, including not only our present program which is for all children between the ages of 3 to 17, but also a program for adults.

It is also hoped and planned that sometime in the future proper integration of the State Board of Health and mental disease hospital programs may be effected.

Anopheline Threshold of Malaria Transmission Noted in Jamaica

By George A. Thompson*

Malaria control operations directed toward reducing adult vector densities by antilarval measures always pose the vexing question: "To what density level must the adult mosquitoes be reduced in order that the hazard of malaria transmission will be negligible?" Such level, of course, will vary for the several species of vector mosquitoes and will depend principally on the habits of each species, on the habits of the human population in the subject area, and on the current abundance of human malaria carriers. In Puerto Rico during World War II, experience indicated that few, if any, new cases of malaria are likely to be contracted by military personnel living in screened quarters if the density index (number of mosquitoes caught per trap per night) of *Anopheles albimanus* Wied. does not rise above two in the intracantonment area (Henderson, 1945).[1] While the present author was stationed at Fort Simonds, Jamaica, B. W. I., an opportunity was afforded for making observations on this relationship between the abundance of the local malaria vector, *A. albimanus*, and malaria transmission. These observations are discussed here.

Only one case of malaria was contracted by military personnel while on the base during the 18-month period, March 1944 through September 1945. Before the onset of the disease, this infected individual had been on duty for about 3 hours at dawn and 3 hours at sunset each day for several weeks at a location near the boundary of the protected area. During this 18-month period, the combination of little rainfall and adequate malaria control activities, both on the military reservation and in the area adjacent to it, resulted in low population densities of *A. albimanus*, as well as of other mosquitoes. The "index" of *A. albimanus* abundance during this period did not rise above five per trap-night. As a result of this favorable situation, there was a relaxation of malaria discipline among both military and civilian personnel. Personal antimalarial measures, such as restricted activities outdoors after sunset, use of repellents, and use of mosquito bars, were not strictly enforced.

In 1945 following this relatively dry 18-month period, the fall rainy season began early, and during some weeks of September and October as much as 3.5 to 6 inches of rain were recorded. The total rainfall for the 2 months was 13.8 and 13.1 inches, respectively. Pasture lands, sugarcane fields, and rice fields remained flooded throughout the period. During this period, daily showers greatly limited the effectiveness of paris-green larvicidal treatments. As a result, the densities of *A. albimanus* adults rose rapidly as was indicated by animal-bait trap collections. Such traps were located at the corners of a rectangle enclosing the housing area and are believed to have furnished a reasonably accurate index to the population of *A. albimanus* entering the area. The average intracantonment collections of *A. albimanus* are plotted in figures 1 and 2. The data were obtained by totaling the number of *A. albimanus* caught in all four traps during each week and dividing the sum by the number of nights the traps were operated that week. This average catch per trap-night is designated as the "density index" of the adult *A. albimanus* population.

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[1] Henderson, J. M.: Anti-malarial measures for protection of military personnel in Puerto Rico and their applicability to civilian malaria control. Puerto Rico J. Pub. Health & Trop. Med. **20**: 419-445 (1945).

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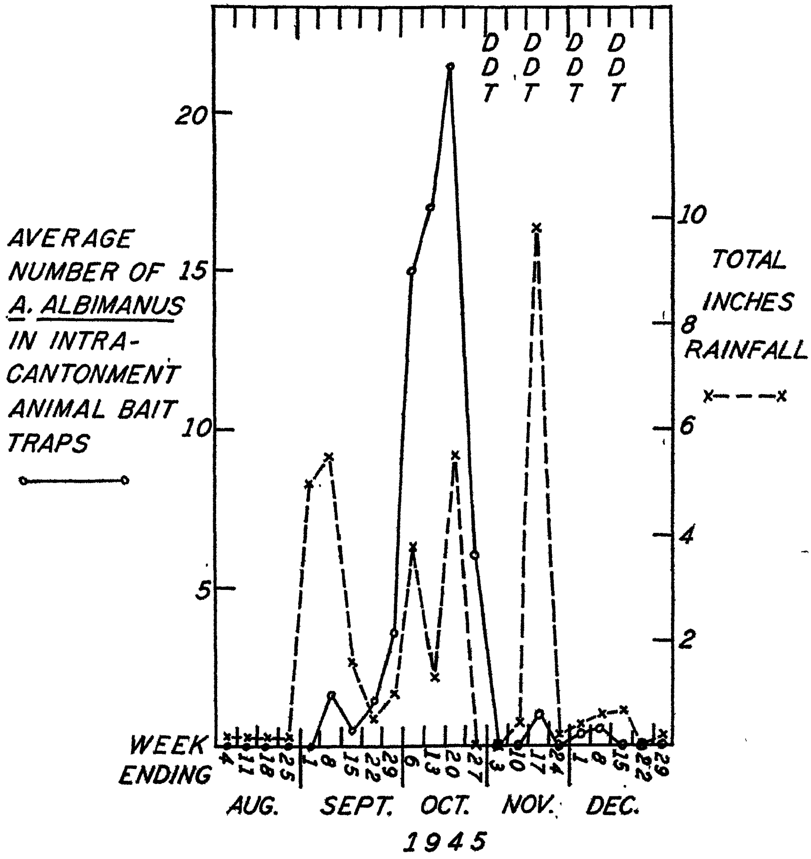

Figure 1. *Anopheles albimanus* density index in intracantonment area compared to weekly rainfall, August–December 1945, Fort Simonds, Jamaica, B. W. I. The dates of larvicidal applications are indicated by the letters DDT.

The density index for the area under observation rose above five *A. albimanus* during the first week in October and remained above five throughout that month. Fourteen days after the density index exceeded five, two military personnel were admitted to the hospital with *Plasmodium falciparum* malaria. During the subsequent 4 days, two additional cases were admitted. None of these men had been off the post during the 4 weeks prior to the onset of the disease, nor had any of them been on night duty. However, two of them had had some exposure to mosquitoes, since they pitched horseshoes nightly after mess until it became too dark to continue the game. It seems reasonable to assume that all four men contracted malaria within the area protected by control operations.

Among the civilian population, 37 cases of malaria were diagnosed

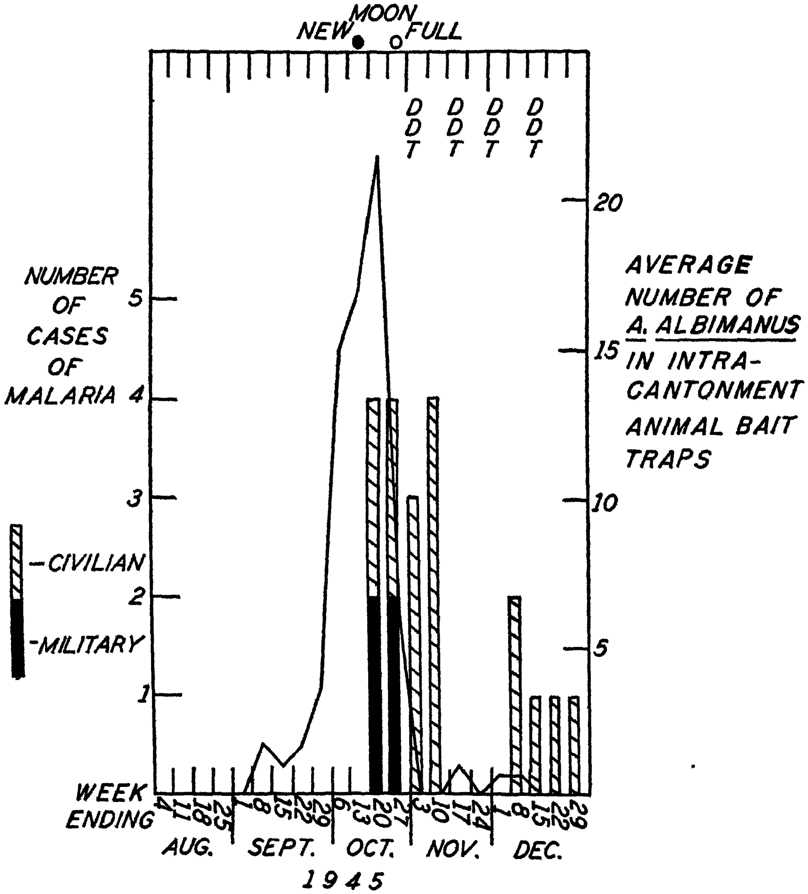

Figure 2. Number of cases of malaria among military and civilian personnel in relation to the weekly *Anopheles albimanus* density index, moon phases, and dates of larvicidal applications. August–December 1945, Fort Simonds, Jamaica, B. W. I.

at the hospital during September and October. Some of these individuals had been repeatedly in highly malarious areas off the post, while the case histories of others indicated that they usually had "chills and fever" every fall. Of the 37 civilian cases, only 16 were considered to have been contracted on the post. These data are presented in figure 2. That malaria during this period was prevalent on the island in extracantonment areas is shown by data furnished by the local medical services covering a spleen survey made during October 1945 among school children. At a town about 5 miles from the post, a parasite rate of 33 percent was found. A house-to-house canvass of the population within a 2-mile radius of the post was made during the third week in November. In a population of about 1,700, approximately 11 percent reported "chills and fever" during that fall. At the height of the malaria season, absenteeism among native workers on the post reached 35 percent, as compared with a normal rate of 10 percent.

During November and December, the United States Army made two aerial applications of DDT per month over the base (fig. 1). Although nearly 10 inches of rain fell during the third week in November, these more effective control measures held *A. albimanus* populations at a low level. Also malaria cases gradually decreased among the native population until the end of December. Thus, with the return of vector abundance to that indicated by density indexes of below five *albimanus* per trap-night, malaria transmission largely ceased.

Summary

Data are presented for malaria cases contracted at a military installation in Jamaica, B. W. I., during the fall of 1945. Although only one case of the disease was contracted by military personnel and transmission among civilians was rare during the 18 months prior to that period, four cases occurred among military personnel, and a much larger number among civilians, about 2 weeks after excessive rainfall caused the animal-bait trap catches of *Anopheles albimanus* to exceed an average of five per trap per night. During the same period, the incidence of malaria among the native population living near the post was estimated at from 11 to 35 percent. It is concluded that in Jamaica, as has been reported for Puerto Rico, few, if any, new cases of malaria will be contracted by personnel living in screened houses and using proper malaria discipline, if the vector level is held below that indicated by an average of five *A. albimanus* per trap per night.

ACKNOWLEDGMENT

The writer expresses his gratitude to Maj. Harry D. Pratt for his assistance, and to Maj. Porter A. Stephens, Col. W. H. W. Komp, Col. George H. Bradley, and Col. John M. Henderson for reviewing the paper.

Plague Epizootic in Cottontail Rabbits

By VERNON B. LINK, M. D., M. P. H.*

On January 6, 1950, a hunter shot and cleaned six cottontail rabbits about 2 miles south of his home in Maljamar, Lea County, New Mexico. Three days later he became ill and developed an axillary bubo. On January 15, a clinical diagnosis of bubonic plague was made at the Veterans Administration Hospital in Albuquerque. The patient was seriously ill by then, but he completely recovered after treatment with streptomycin and sulfadiazine

The State Health Department inspected Maljamar and noted that the town was infested with domestic rats. The question immediately arose as to whether these rats were a possible source of the infection. If the rats were involved in an epizootic, then there existed a far greater hazard to the residents of Maljamar than if wild rodents only were concerned. To answer this question, the State Health Officer requested the Western Communicable Disease Center Laboratory to make a plague survey in Lea County.

The survey crew began work February 7. They hunted and trapped domestic and wild rodents in and around Maljamar during the next 2 weeks before proceeding to other parts of Lea County. During this period, 308 wild animals were obtained, and 394 fleas and 202 ticks were removed from them. Numerous cottontail rabbits and pack rats were found dead. Tissue and fleas from two specimens of each proved to be plague-infected. In addition, fleas from other pack rats, as well as from pack rat nests and grasshopper mice, were positive for plague. No plague was found in domestic rats, and none of the 32 rats trapped in Maljamar had fleas.

These findings provide epidemiologic support for the surmise that the patient had acquired plague from cottontail rabbits. Heretofore, rabbits were not believed subject to epizootics of plague. During the 15 years in which this laboratory has conducted plague surveys, 3,693 fleas from 431 cottontail rabbits, and 873 fleas from 337 jack rabbits have been tested. Two pools of fleas from cottontail rabbits and the tissue of one cottontail rabbit found dead were positive for plague. No specimens from the jack rabbits were positive.

The evidence obtained in Lea County implicating cottontail rabbits for the first time in an active plague epizootic changes the opinion formerly held that they were not too great a hazard to man. Health officers in counties with known active plague foci should warn hunters of the danger involved in handling and cleaning rabbits.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MAY 6, 1950

For the current week in the Nation, reported cases of influenza continued to decrease from the preceding week, from 5,548 to 3,399. The total for the corresponding week last year was 2,023, and the 5-year (1945–49) median was 1,432. The cumulative total for the first 18 weeks of the year was 233,810, which may be compared with the corresponding total of 67,420 for the same period last year and 290,376 for 1947, the highest on record for the past 5 years. The corresponding 5-year median was 130,335.

Idaho reported an increase from 34 cases of influenza last week to 140 currently, and Alaska reported a rise from 6 to 124 cases for the same period.

Reported incidence of whooping cough was higher for the current week (2,691 cases) than for the 5-year median (2,073 cases). The high corresponding week in the last 5 years occurred in 1947 when 3,609 cases were reported. The cumulative total for the first 18 weeks of 1950 was 47,110, which may be compared with 18,040 for the same period in 1949 and 48,000 for 1947, the highest on record during the past 5 years.

Reported cases of meningococcal meningitis were 86 for the current week, as compared with 66 for the corresponding week last year and 79 for the 5-year median. The cumulative total for 18 weeks of this year was 1,703, which may be compared with the corresponding total of 1,517 for the same period in 1949 and 4,167 in 1945, the highest on record during the past 5 years.

Reported cases of diphtheria, measles, scarlet fever, and typhoid and paratyphoid fever for the current week were below the corresponding 5-year medians and below the 5-year cumulative medians for the first 18 weeks of the year.

A total of 72 cases of acute poliomyelitis was reported for the week, which includes 14 cases in California and 28 cases in Texas.

Twelve cases of infectious encephalitis were reported in the United States for the current week; 1 case of psittacosis and 2 cases of anthrax were reported.

Telegraphic case reports from State health officers for week ended May 6, 1950

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	--------	--------	7	36	1	16	--------	--------	1	--------	--------	--------	27	--------
New Hampshire	--------	--------	--------	3	--------	--------	--------	--------	--------	--------	--------	--------	6	--------
Vermont	--------	--------	--------	8	--------	--------	--------	--------	3	--------	--------	--------	40	--------
Massachusetts	4	--------	--------	451	1	--------	--------	--------	140	--------	--------	3	132	--------
Rhode Island	1	--------	1	19	2	5	--------	--------	4	--------	--------	--------	36	--------
Connecticut	--------	--------	--------	115	--------	39	--------	--------	26	--------	--------	--------	73	--------
MIDDLE ATLANTIC														
New York	5	4	(2)	1,602	4	257	4	--------	[3] 142	--------	--------	3	159	16
New Jersey	1	--------	--------	1,561	5	58	--------	--------	62	--------	--------	1	143	--------
Pennsylvania	5	--------	--------	770	3	81	1	--------	149	--------	2	2	180	1
EAST NORTH CENTRAL														
Ohio	14	--------	4	559	4	125	1	--------	159	--------	--------	--------	246	6
Indiana	7	--------	--------	872	--------	9	1	--------	55	--------	--------	--------	80	16
Illinois	--------	--------	13	1,021	6	153	2	--------	33	--------	2	1	103	3
Michigan	3	2	3	1,384	2	62	1	--------	138	--------	--------	1	212	4
Wisconsin	--------	--------	133	590	1	17	--------	--------	75	--------	--------	--------	151	--------
WEST NORTH CENTRAL														
Minnesota	--------	--------	3	313	--------	7	--------	--------	34	--------	--------	1	57	--------
Iowa	--------	--------	--------	382	1	1	--------	--------	9	--------	--------	--------	25	13
Missouri	1	--------	7	72	2	32	--------	--------	29	--------	--------	3	21	--------
North Dakota	--------	--------	11	4	2	215	--------	--------	1	--------	--------	--------	1	--------
South Dakota	1	--------	--------	38	--------	1	--------	--------	3	--------	--------	--------	1	--------
Nebraska	--------	--------	29	229	--------	10	1	--------	23	--------	--------	--------	7	--------
Kansas	1	--------	1	55	--------	22	--------	--------	17	--------	--------	--------	28	2
SOUTH ATLANTIC														
Delaware	--------	--------	--------	6	1	--------	--------	--------	2	--------	--------	--------	13	--------
Maryland	1	--------	10	91	5	52	1	--------	17	--------	1	1	67	--------
District of Columbia	--------	--------	--------	70	--------	25	--------	--------	4	--------	--------	1	4	--------
Virginia	1	--------	475	119	9	58	--------	--------	8	--------	--------	2	81	2
West Virginia	--------	--------	112	252	--------	6	2	--------	4	--------	--------	1	52	2
North Carolina	3	--------	--------	280	1	--------	2	--------	13	--------	--------	--------	96	--------
South Carolina	--------	--------	59	58	2	13	--------	--------	1	--------	--------	1	15	3
Georgia	3	4	107	88	6	341	--------	--------	3	--------	3	--------	3	11
Florida	3	--------	7	150	--------	22	1	--------	4	--------	--------	--------	13	--------

EAST SOUTH CENTRAL														
Kentucky	1	---	120	464	4	21	---	---	6	---	---	5	38	17
Tennessee	2	1	28	126	5	---	1	2	31	---	---	2	41	3
Alabama	5	---	81	74	1	76	---	---	8	---	---	1	15	8
Mississippi	3	---	27	57	2	30	1	---	2	---	---	---	2	---
WEST SOUTH CENTRAL														
Arkansas	1	---	300	94	1	37	3	---	---	---	6	1	50	7
Louisiana	---	---	13	14	2	36	2	1	6	---	1	1	---	---
Oklahoma	1	---	192	21	2	46	---	---	5	---	---	---	14	2
Texas	13	1	1, 237	835	9	332	28	---	27	---	1	3	262	22
MOUNTAIN														
Montana	---	---	30	86	---	---	---	---	20	---	1	1	4	---
Idaho	1	---	140	92	---	---	1	1	6	---	---	---	18	---
Wyoming	---	---	---	39	---	---	---	---	2	---	---	---	---	---
Colorado	1	---	37	116	---	50	---	1	7	---	---	1	15	4
New Mexico	---	---	---	31	---	9	---	---	2	---	---	---	15	---
Arizona	---	---	150	123	---	38	1	---	19	---	---	---	63	---
Utah	1	---	---	263	---	---	---	---	1	---	---	1	10	---
Nevada	---	---	---	4	---	1	1	---	---	---	---	---	---	---
PACIFIC														
Washington	---	---	20	139	---	1	---	---	29	---	---	2	32	---
Oregon	---	---	35	11	1	30	3	1	9	---	---	1	40	---
California	6	---	7	665	1	32	14	---	68	---	---	1	---	---
Total	89	12	3, 399	14, 452	86	2, 366	72	6	1, 407	---	17	41	2, 691	142
Median, 1945–49	188	11	1, 432	27, 787	79	---	36	7	2, 047	9	14	54	2, 073	---
Year to date, 18 weeks	2, 548	236	[4] 233, 810	160, 816	1, 703	45, 268	[5] 1, 586	24	30, 695	21	363	800	47, 110	2, 787
Median, 1945–49	4, 821	151	130, 335	334, 940	1, 596	---	672	22	47, 464	111	329	855	38, 450	---
Seasonal low week ends	(27th) July 9	---	(30th) July 30	(35th) Sept. 3	(37th) Sept. 17	---	(11th) Mar. 18	---	(32d) Aug. 13	(35th) Sept. 3	---	(11th) Mar. 18	(39th) Oct 1	---
Since seasonal low week	6, 819	---	[4] 264, 340	179, 946	2, 616	---	[5] 451	---	47, 134	41	---	290	68, 646	---
Median, 1944–45 through 1948–49	12, 387	---	173, 893	369, 886	2, 568	---	219	---	73, 693	165	---	382	66, 773	---

---

[1] Including cases reported as salmonellosis.

[2] New York City only.

[3] Including cases reported as streptococcal sore throat.

[4] Excludes 40,000 cases estimated by county health officers to have occurred in Kentucky during the period Jan. 1 to Apr. 8, 1950, and 4,000 cases estimated to have occurred in Jones County, Iowa.

[5] Deduction: Kentucky, week ended Feb. 11, 3 cases, week ended Apr. 1, 1 case.

Anthrax: New Jersey and Pennsylvania, 1 case each.

Psittacosis: Indiana, 1 case.

Alaska: Influenza 124, pneumonia 2, whooping cough 4.

Hawaii: No cases reported.

DEATHS DURING WEEK ENDED MAY 6, 1950

	Week ended May 6, 1950	Corresponding week, 1949
Data for 94 large cities of the United States:		
Total deaths	9, 302	9, 040
Median for 3 prior years	9, 208	
Total deaths, first 18 weeks of year	177, 330	175, 461
Deaths under 1 year of age	603	652
Median for 3 prior years	660	
Deaths under 1 year of age, first 18 weeks of year	11, 289	11, 867
Data from industrial insurance companies:		
Policies in force	69, 821, 199	70, 427, 217
Number of death claims	12, 284	12, 988
Death claims per 1,000 policies in force, annual rate	9. 2	9. 6
Death claims per 1,000 policies, first 18 weeks of year, annual rate	10. 0	9. 7

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended April 22, 1950.—Cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis					4	1	2	1	1	1	10
Chickenpox	1		55	1	233	163	25	21	39	193	731
Diphtheria					3						3
Dysentery:											
Amebic						1				1	2
Bacillary					3	4			1	1	9
German measles			79		17	920		102	117	446	1, 681
Influenza			18			38	5				61
Measles			1	35	571	347	65	63	53	165	1, 300
Meningitis, meningococcal									1	1	2
Mumps			108		224	337	5	71	147	346	1, 238
Scarlet fever	1				81	31	3	10	66	11	203
Tuberculosis (all forms)	19		12	9	121	22	16	27	1	38	265
Typhoid and paratyphoid fever					6			2		4	12
Venereal diseases:											
Gonorrhea	2		12	10	141	46	17	16	35	43	322
Syphilis	2		2	9	47	31	9	13	2	7	122
Other forms										1	1
Whooping cough			41		106	53	9	2	1	64	276

FINLAND

Notifiable diseases—March 1950.—Cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Diphtheria	116	Poliomyelitis	4
Dysentery	10	Scarlet fever	853
Gonorrhea	540	Syphilis	43
Meningitis, meningococcal	12	Typhoid fever	11
Paratyphoid fever	74		

MADAGASCAR

Notifiable diseases—March 1950.—Notifiable diseases were reported in Madagascar and Comoro Islands as follows:

Disease	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Beriberi			1	
Bilharziasis			64	
Diphtheria	1		1	
Dysentery:				
Amebic	9		161	1
Bacillary			2	
Erysipelas			21	
Influenza	17		3,234	48
Leprosy			36	
Malaria	240	1	34,020	257
Measles	3		37	3
Meningitis, meningococcal			3	1
Mumps	2		145	
Paratyphoid fever			1	
Plague			10	6
Pneumonia (all forms)	1		615	133
Poliomyelitis			1	
Puerperal infection			2	
Trachoma	1			
Tuberculosis, respiratory	3	1	87	12
Typhoid fever	4	1	8	3
Whooping cough	1		181	7

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

(Cases)

Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January-February 1950	March 1950	April 1950—week ended—				
			1	8	15	22	29
ASIA							
Burma	1	5				1	
Bassein						1	
Maubin		3					
Rangoon		1					
India	[1] 18,558	9,480	[2] 1,956	[2] 1,179	685	777	
Calcutta	[1] 956	899	365	406	685	777	
Cocanada	2						
Cuddalore	17	9					
Madras	8	3					
Masulipatam	45	1					
Negapatam	53	14					
Tellicherry	27						
Tuticorin	25						
Indochina		6					
Cambodia		5					
Cochinchina		1					
Rachgia		1					
Pakistan	3,578	3,058	1,602	57	36	11	
Chittagong		25	3	7	2	11	
Dacca	11	8		50	34		

---

[1] Includes import cases. [2] Preliminary figures.

PLAGUE

(Cases)

(P=present)

Place	January-February 1950	March 1950	April 1950—week ended— 1	8	15	22	29
AFRICA							
Belgian Congo	3			1			
Costermansville Province	2						
Stanleyville Province	1			1			
Madagascar	24	10					
Rhodesia, Northern		2					
Union of South Africa	4	P				1	
Orange Free State	[1] 2					1	
ASIA							
Burma	86	12	1	3	2		
Bassein				1			
Bhamo	[2] 1						
Henzada		3					
Kyaiklat		7					
Myaungmya		1					
Myingyan		1					
Rangoon				[2] 1	1		
Yenangyaung	11						
China:							
Chekiang Province	8	2					
Wenchow	[3] 4						
Fukien Province	68	51					
Kwangsi Province	[3] 63						
Kwangtung Province	15						
India	[4] 15,436	13,271	[5] 422	[5] 587			
Indochina (French):							
Annam	17	13	4		2	4	
Cambodia	4	5					
Cochinchina			2				
Laos	1	1					
Java	226	32	9	9	4		
Pakistan	[6] 1						
Thailand (Siam)	36	15					
SOUTH AMERICA							
Ecuador	4						
Loja Province	4						
Peru	5						
Piura Department	5						
Venezuela					5		
Miranda State					5		

---

[1] Includes one suspected case. [2] Imported. [3] Deaths. [4] Revised figures. [5] Preliminary figures.
[6] In Karachi, imported.

SMALLPOX

(Cases

(P=present)

AFRICA							
Algeria	24	6		[1] 5			
Bechuanaland	3						
Belgian Congo	352	276	34				
British East Africa:							
Kenya			1				
Nyasaland	134	69					
Tanganyika	86	18					
Cameroon (British)	217	14					
Cameroon (French)	12	7		[1] 6			
Dahomey	135	37		[1] 2	[2] 4		
Egypt	[3] 2	[4] 1					
Eritrea		1					
Ethiopia	4	2					
French Equatorial Africa	264	98		[1] 7	[2] 11		
French Guinea		2					
French West Africa: Haute Volta	44	75		[1] 5			

See footnotes at end of table.

SMALLPOX—Continued

Place	January-February 1950	March 1950	April 1950—week ended—				
			1	8	15	22	29
AFRICA—continued							
Gambia	4	---	---	---	---	---	---
Gold Coast	3	2	---	---	13	6	---
Ivory Coast	148	217	---	[1] 35	---	---	---
Libya	2	---	---	---	---	---	---
Mauritania	1	---	---	---	---	---	---
Morocco (French)	---	5	---	---	---	---	---
Mozambique	51	12	---	---	---	---	---
Nigeria	3,755	[5] 1,522	[6] 17	[6] 16	[6] 11	[6] 10	---
Niger Territory	336	168	---	[1] 40	---	---	---
Rhodesia:							
Northern	1	2	---	---	---	---	---
Southern	162	84	---	---	---	---	---
Senegal	2	---	---	---	---	---	---
Sierra Leone	8	7	---	---	---	---	---
Sudan (Anglo-Egyptian)	20	7	12	1	3	3	---
Sudan (French)	39	23	---	[1] 11	---	---	---
Togo (French)	23	15	---	[1] 4	---	---	---
Tunisia	---	1	---	---	---	---	---
Union of South Africa	253	P	P	P	P	---	---
ASIA							
Afghanistan	120	---	---	---	---	---	---
Arabia	232	47	13	[7] 14	---	---	---
Bahrein Islands: **Bahrein**	8	3	22	---	---	---	---
Burma	2,967	1,022	172	89	98	---	---
China	298	136	13	13	19	15	---
India	26,437	18,083	[8] 522	[8] 486	[8] 537	[8] 657	---
India (Portuguese)	---	1	---	---	---	---	---
Indochina	199	40	6	4	1	4	---
Indonesia:							
Java	243	170	19	45	37	186	---
Sumatra	[9] 34	3	1	---	7	---	---
Iran	96	26	1	4	1	---	---
Iraq	48	24	4	2	5	12	5
Israel	15	---	---	---	---	---	---
Japan	3	1	---	---	---	---	---
Korea (Southern)	[10] 278	[11] 10	---	---	---	---	---
Lebanon	[4] 1	---	---	---	---	---	---
Pakistan	2,702	2,114	546	[8] 13	[8] 13	[8] 18	---
Palestine	[12] 63	16	---	---	---	---	---
Syria	8	7	---	---	---	---	---
Thailand (Siam)	420	24	8	---	2	---	---
Transjordan	[12] 18	1	---	---	---	---	---
Turkey (See Turkey in Europe).							
EUROPE							
Great Britain:							
England:							
Blackburn	---	---	[13] 1	---	[13] 1	---	---
Liverpool	---	---	---	---	[4] 1	---	---
Scotland: **Glasgow**	---	---	---	---	[14] 21	---	[13] 2
Turkey	5	---	---	---	1	1	---
NORTH AMERICA							
Mexico	41	16	---	---	3	---	---
SOUTH AMERICA							
Argentina	148	43	5	11	14	15	---
Brazil	16	2	---	1	---	---	---
Chile	---	---	---	---	---	[15] 2,419	---
Colombia	41	9	---	---	---	---	---
Ecuador	[16] 62	3	---	---	---	---	---
Venezuela	19	10	---	1	---	---	---
OCEANIA							
Australia: **Fremantle**	---	[17] 1	---	---	---	---	---

---

[1] Apr. 1–10, 1950. [2] Apr. 11–20, 1950. [3] Includes 1 imported case. [4] Imported. [5] Feb. 26–Mar. 11, 1950. [6] In Lagos only. [7] Includes 1 case landed at Aden Apr. 5, from a vessel. [8] In sea and air ports only. [9] Includes suspected cases. [10] Only report from city of Seoul (8 cases) available for the month of February. [11] For the city of Seoul only. [12] For the month of January only. [13] Suspected. [14] Reported Mar. 26–Apr. 11, 1950. [15] Number of cases reported up to Apr. 25 in outbreak that began in March. [16] Corrected figure. [17] Off-shipping.

TYPHUS FEVER*

(Cases; P = present)

Place	January-February 1950	March 1950	April 1950—week ended—				
			1	8	15	22	29
AFRICA							
Algeria	35	12	---------	[1] 1	---------	---------	---------
Basutoland	16	4	---------	---------	---------	---------	---------
Belgian Congo	[2] 11	6	6	---------	---------	---------	---------
British East Africa: Kenya	2	2	[3] 2	---------	[3] 1	---------	---------
Egypt	20	8	6	---------	---------	---------	---------
Eritrea	7	1	---------	---------	---------	---------	---------
Ethiopia	128	23	---------	---------	---------	---------	---------
Gold Coast	2	---------	---------	---------	---------	---------	---------
Libya	32	18	1	1	5	---------	---------
Madagascar	[3] 1	---------	---------	---------	---------	---------	---------
Morocco (French)	2	1	---------	---------	---------	---------	---------
Morocco (International Zone)	1	---------	---------	---------	---------	---------	---------
Nigeria	1	---------	---------	---------	---------	---------	---------
Sudan (Anglo-Egyptian)	4	---------	---------	---------	---------	---------	---------
Tunisia	12	6	---------	---------	---------	---------	---------
Union of South Africa	29	P	---------	P	---------	---------	---------
ASIA							
Afghanistan	270	---------	---------	---------	---------	---------	---------
Burma	[3] 7	[3] 1	---------	---------	---------	---------	---------
China	[2] 4	3	---------	---------	---------	---------	---------
India	5	---------	---------	---------	---------	---------	---------
India (Portuguese)	---------	1	---------	---------	---------	---------	---------
Indochina	1	4	---------	---------	3	---------	---------
Indonesia:							
Java	2	---------	---------	---------	---------	---------	---------
Sumatra	1	---------	---------	---------	---------	---------	---------
Iran	55	15	17	6	---------	---------	---------
Iraq	[2] 14	18	6	4	9	6	10
Japan	495	175	[4] 29	[4] 15	[4] 2	[4] 5	---------
Korea (Southern)	[3] 341	54	---------	---------	---------	---------	---------
Lebanon	---------	1	---------	---------	---------	---------	---------
Pakistan	22	10	2	6	2	---------	---------
Straits Settlements	[2] 3	---------	---------	---------	---------	---------	---------
Syria	1	[2] 3	[3] 8	[3] 2	[3] 13	---------	---------
Transjordan	3	9	---------	---------	---------	---------	---------
Turkey (see Turkey in Europe).							
EUROPE							
France	1	---------	---------	---------	---------	---------	---------
Germany (British Zone)	[2] 2	---------	---------	---------	---------	---------	---------
Germany (French Zone)	2	---------	---------	---------	---------	---------	---------
Germany (United States Zone)	1	---------	---------	---------	---------	---------	---------
Great Britain: Island of Malta	[3] 2	---------	---------	---------	---------	---------	---------
Greece	[2] 17	---------	---------	---------	---------	---------	---------
Hungary	1	1	---------	---------	---------	---------	---------
Italy	21	---------	---------	---------	---------	---------	---------
Sicily	13	---------	---------	---------	---------	---------	---------
Poland	37	---------	---------	---------	---------	---------	---------
Spain	3	4	---------	---------	---------	---------	---------
Turkey	64	27	6	1	4	4	5
Yugoslavia	34	42	---------	6	29	---------	---------
NORTH AMERICA							
Costa Rica [3]	1	2	---------	---------	---------	---------	---------
Guatemala [3]	8	---------	---------	---------	---------	---------	---------
Jamaica [3]	3	---------	1	---------	1	---------	---------
Mexico [2]	23	8	2	---------	2	---------	---------
Puerto Rico [3]	2	2	---------	---------	---------	---------	---------
SOUTH AMERICA							
Argentina	[3] 1	---------	---------	---------	---------	---------	---------
Chile	[2] 29	14	1	2	2	2	---------
Colombia	57	23	5	---------	---------	---------	---------
Curaçao	1	---------	---------	---------	---------	---------	---------
Ecuador	[2] 38	2	---------	---------	2	---------	---------
Venezuela	[3] 1	[3] 2	---------	---------	---------	---------	---------
OCEANIA							
Australia	[3] 20	[3] 13	[3] 6	[3] 1	---------	---------	---------
Hawaii Territory	---------	1	---------	---------	---------	---------	---------

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*Reports from some areas are probably murine type, while others include both murine and louse-borne types.

[1] Apr. 1–10, 1950. [2] Includes murine type. [3] Murine type. [4] In Tokyo and Yokohama only.

YELLOW FEVER

(C=cases; D=deaths)

Place	January-February 1950	March 1950	April 1950—week ended—				
			1	8	15	22	29
AFRICA							
French Equatorial Africa C	1						
Port Gentil C	[1] 1						
Gold Coast C	5	2		1			
Ankobra Ferry D	1						
Bisiasi D		[1] 1					
Kade C		1					
Oda Area:							
Akwatia C	[1] 3			[1] 1			
Atiankama C	1						
Sierra Leone C	1						
Koinadugu District C	1						
NORTH AMERICA							
Panama:							
Colon D	1						
SOUTH AMERICA							
Bolivia:							
Chuquisaca Department C	[2] 70	[3] 850					

[1] Suspected. [2] Azero Province, with 15 deaths. [3] Reported in Azero Province during the period Jan. 1-Mar. 14, 1950, with 230 deaths.

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TUBERCULOSIS CONTROL ISSUE NO. 52

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Studies on Experimental Histoplasmosis, I

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
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Public Health Reports

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—Editorial—

Case Finding Among Private Patients

It is recognized that there are many reasons for the rapid decline in the incidence of tuberculosis during the past 50 years. It is impossible to evaluate accurately, or even approximately, the relative influence of complex socioeconomic conditions and of control measures in bringing about this favorable result.

In 1937, Wade H. Frost concluded that the point had been reached in the United States where there is a gradual downward trend in the incidence of tuberculosis, and that, barring major upsets in civilization, the eventual eradication of the disease can be expected. The continued decline in the annual number of deaths from tuberculosis during the past 12 years, in spite of the adverse conditions caused by a great war, is ground for confidence in the accuracy of Frost's conclusion.

Even though control measures are only one factor in the eradication of tuberculosis, they may very well be the *decisive* factor. Anything which will reduce the size of the reservoir of the tubercle bacillus in human beings will lessen the number of new cases of tuberculosis. Every case of the disease, actually or potentially infectious, which is discovered and brought under control is a step in reducing the size of this reservoir. In the aggregate, control measures may represent the weight which will tip the balance in favor of the human race. It is this consideration which gives importance to any method which discloses a considerable number of cases of tuberculosis, and especially of those which are symptomless.

Although statements to the contrary have been made recently, nothing is more completely proved than the fact that approximately one-half of all cases of significant tuberculosis have no symptoms, or symptoms so slight as to escape notice. According to the National Tuberculosis Association estimates, there are a quarter of a million unknown cases of tuberculosis in the United States—at least as many

This is the fifty-second of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which appear in the first week of each month. The series began with the Mar. 1, 1946, issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

as there are known cases—and recent experience indicates that the unknown cases far outnumber the known. In the 1948 mass survey in Washington, D. C., 4,098 out of 4,665 cases of tuberculosis discovered were previously unknown to the health department. Similar findings have been reported in all other large surveys.

From its small beginnings during the decade 1930–40, the mass survey method for tuberculosis detection has advanced in the United States to the point where at present about 14 million people annually undergo chest X-ray examinations. This is a significant achievement, and although it can be extended until the equipment already existing is fully utilized, it still does not represent a case-finding rate sufficiently high to insure control of the disease in any reasonable time. It is important that the mass survey programs be enlarged, but, in the meantime, every method which promises disclosure of a considerable number of cases of tuberculosis should be utilized.

Sixty to eighty million Americans, for one reason or another, annually consult a doctor, and it is known that the tuberculosis rate among them is much higher than among the general population. For this reason it is highly desirable that private physicians, including general practitioners, internists, and specialists, obtain a survey film of every patient who consults them unless the results of a recent chest X-ray survey are available.

It has been the practice of some radiologists for many years to make a single film of the chest in cases referred for other examinations, especially in cases referred for gastrointestinal study. This has disclosed many unsuspected chest conditions including tuberculosis. Now that photofluorography has greatly reduced the cost of such a survey film, it should become routine practice among radiologists; its quite nominal cost can be absorbed in the major examination.

This reservoir of cases, however, is small compared with the vast number who consult general practitioners and internists. Methods can undoubtedly be devised whereby all such patients, at least those who are 15 years of age or older, can have a survey film made without cost to the patient—even a small charge would probably prevent wide use of the method.

It is not necessary that any one method be adopted to accomplish the desired end. In some communities, the local or State health department could, perhaps, defray the cost as part of the general tuberculosis prevention program, especially in view of the fact that case finding in the smaller group would be relatively much more productive than in the usual mass survey. In other communities, it could be done by the tuberculosis association. In still others, general hospitals which have adopted a hospital admission X-ray survey program could enlarge the program to include survey films for the private patients of members of the hospital staff. Furthermore, it could very well become general practice among radiologists to make available such service to the general profession.

The details of such a program may seem numerous and difficult at first thought, but they can be worked out. The first essential for its success is the interest of the private physicians of each community. They are in the best position to promote it and to carry it out.

Today, because of procedures which have become routine, the private physician's office is a bulwark against such diseases as smallpox and diphtheria. In like manner, it can become one of the most effective agencies for tuberculosis control. By promoting such a public health measure, the general practitioners of the Nation would be acting in line with the great tradition of the profession as a force for prevention as well as cure of disease.

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Tuberculosis Case Finding in General Hospitals

By Zella Bryant, R. N., M. P. H.*

For many years, the chest X-ray has been recognized as a superior method of diagnosing pulmonary tuberculosis, but when only large films could be used, the cost in time and facilities prevented its general use to screen out tuberculosis among large groups of people. The fluoroscope was tried in some hospitals, and in the hands of expert clinicians it was recognized as a valuable diagnostic aid, but it failed to supply an objective record of the findings. The development of the small film photofluorograph in the late 1930's made possible the examination of large numbers of people quickly, easily, and at a relatively low cost, and gave impetus to tuberculosis case-finding programs which have expanded greatly in the past 10 years. Limited progress has been made, however, in the development of case-finding programs in general hospitals.

The responsibility of the general hospital in tuberculosis control is not a new concept. The American Hospital Association has been on record since 1921 as urging provisions for at least temporary care of tuberculous patients in general hospitals. Even before the development of small-film photofluorography, programs for routine chest X-ray of all admissions were recommended at Association meetings. In 1942, a pamphlet issued by the Association included specific suggestions for such programs. Similar recommendations have been made by the American Medical Association, the United States Public Health Service, the National Tuberculosis Association, the American Trudeau Society, and other State and national organizations and agencies.

Early interest in tuberculosis case finding in general hospitals was aroused as a result of programs in hospitals where tuberculin tests and chest X-rays were made on medical and nursing students. It was found that a large number of students who had entered as nonreactors had become positive tuberculin reactors shortly after beginning to work with patients, even in hospitals which did not knowingly admit tuberculous patients.

In 1943, the Committee on Hospital Personnel of the American Trudeau Society and the American Hospital Association sent questionnaires to 934 hospitals with schools of nursing to determine practices regarding tuberculosis. The results obtained from this survey indicated that 85 percent made X-rays of their student nurses; 28

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percent, of medical students; 31 percent, of graduate nurses; and 17 percent, of other employees. The Committee reported that in spite of wartime difficulties, 56 hospitals took X-rays of all admitted patients (*1*).

Studies of the Problem

Evidence of unrecognized cases of tuberculosis in general hospitals, and the results obtained from routine X-ray examinations of persons admitted to general hospitals and clinics were reported in the studies reviewed below. Information is included concerning the development of programs, the objectives and principles which are involved, and procedures which have proved effective.

Since this paper is concerned with tuberculosis case finding, other chest lesions discovered through routine X-ray of patients admitted to general hospitals will not be discussed. Similarly, tuberculosis among hospital personnel will be considered only in relation to the historical development of the program.

Swedish Hospital, Minneapolis, Minn.

Mills and Stewart (*2*) conducted a survey at Swedish Hospital, Minneapolis, Minn., during the month of January 1932, in which 586 persons including patients, employees, and graduate and student nurses were given Mantoux tests followed by X-ray examination of all positive tuberculin reactors. Diagnosed cases of advanced tuberculosis admitted to the hospital during the month were not included in the survey. A total of 353 patients were tested, of whom 67 were positive reactors to tuberculin. Of these, 47 had X-ray examinations, and evidence of tuberculosis reinfection was found in 7.5 percent of the cases X-rayed. Five persons who were admitted to the hospital for other conditions were proven to have reinfection type tuberculosis; all five were free from symptoms suggesting tuberculosis. A chest X-ray might have been recommended for one person who had asthma.

University Hospital, Ann Arbor, Mich.

Hodges, (*3*, *4*, *5*) of University Hospital, Ann Arbor, Mich., made one of the early studies of routine X-rays of hospital admissions which led to the conclusion that unrecognized cases of tuberculosis could be found through preliminary chest X-ray of all hospital admissions.

The study was made during 11 working days from June 27 to July 13, 1935; a total of 1,116 patients were X-rayed, and 1,101 satisfactory films were taken. Of this number, 8.1 percent showed evidence of lung changes, and approximately 1 percent of the patients were found to have significant chest conditions suggestive of active tuberculosis.

Criteria were set up prior to the study to determine whether it would be profitable to make a chest X-ray on all persons registering at the University Hospital. It was decided on the basis of the findings that through this method (1) greater diagnostic accuracy is possible (14 persons in this group with no symptoms indicating the need of X-ray were found to have questionable lesions); (2) the speed of diagnosis is increased; (3) the cost is not prohibitive and could be borne by the hospital with no extra charge to the patient; and (4) the X-ray department is strengthened in the long run, since more cases are referred for additional X-ray than would otherwise be requested. This study is frequently quoted in the literature since accurate records were kept, and it was conducted to test a specific hypothesis.

In April 1939, the Kellogg Foundation gave the money for building alterations and equipment necessary for X-rays to be made on all patients admitted to the University Hospital. This program began operations on July 1, 1941, and during the first 4 weeks, 7,841 persons were examined. Of these, 9.3 percent showed evidence of abnormal chest conditions which needed further study; 0.8 percent had tuberculosis in active form. The experience in this hospital will be discussed later in relation to methods which may be applicable to programs in other general hospitals.

Survey in Up-State New York

To determine the size of the tuberculosis problem in general hospitals, Plunkett and Mikol (*6, 7*) made a study of 4,853 adult admissions to 14 hospitals in 10 cities of up-State New York in 1937–38. Interest in making the study was stimulated by the fact that about 10 percent of the total deaths from tuberculosis in the area during 1936–37 occurred in hospitals with no provision for care of tuberculosis patients; 74 percent of these deaths were due to pulmonary tuberculosis, and 61 percent were not reported as such until after death.

The hospitals included in the study were selected at random and diversified as to bed patients; 4 were in cities under 50,000; 3, in cities between 50,000 and 100,000; and 7, in cities over 100,000 population. Patients over 15 were selected for X-ray excluding acutely ill patients, known cases of tuberculosis, and persons admitted to the tuberculosis service and out-patient departments. Films which showed significant or questionable lesions were read by personnel in the division of tuberculosis, State department of health, and returned to the hospital with the report of findings.

The incidence of reinfection tuberculosis and clinically significant disease discovered in these 14 hospitals through routine chest X-ray examinations of hospital admissions in 1937–38 was as follows:

Films studied	*Evidence of reinfection*		*Clinically significant lesions*	
	Number	*Percent*	*Number*	*Percent*
4, 853	128	2. 6	51	1. 1

In 27 of the cases with clinically significant lesions (or 0.6 percent of the total number), tuberculosis had not been considered a possibility, and the disease would probably have been overlooked had not the X-ray been a routine procedure. Five of these cases were diagnosed as far advanced, 12, as moderately advanced, and 10, as in the minimal stage of the disease. There was no significant difference in the proportion of cases found in the various departments—medical, surgical, and obstetrical. None of the cases found had been previously reported.

The authors applied the 0.6 percent yield of unsuspected clinically significant tuberculosis found in this study to the number of adult admissions in general hospitals throughout the United States for 1947 and estimated that, provided similar conditions prevailed in the other hospitals of the country, more than 40,000 unrecognized cases of pulmonary tuberculosis are admitted to general hospitals each year.

It was pointed out in this study that general hospital admissions constitute a special population group which is readily accessible for study and handling under ideal conditions since professional personnel and scientific equipment are easily available for the necessary diagnostic services. It was noted that X-ray may be looked upon as costly, but that human economy should be considered as important if not more important than administrative economy.

The benefits to the hospital in initiating the program were listed as: (1) protection of personnel, (2) provisions for a permanent record of the patient, (3) improvement in staff efficiency, and (4) better service to patients. The suggested benefits to the community were: (1) more effective case finding, (2) earlier diagnosis of cases when treatment is more effective, (3) greater protection through the isolation of open cases, and (4) the discovery of other significant chest conditions.

Meyer Memorial Hospital, Buffalo, N. Y.

In 1939–42, Farber and Clark (*8*) made a study in Meyer Memorial Hospital, Buffalo, N. Y., to evaluate the danger imposed upon hospital personnel by unrecognized cases of tuberculosis. Although all known cases of tuberculosis in the hospital were isolated on wards of the tuberculosis service, and all suspects were isolated on special wards where contagious disease techniques were employed, previous records showed that approximately 30 to 35 percent of the students became tuberculin reactors in their first year before assignments to either of these wards. This suggested that unsuspected tuberculosis on general wards was an important source of tuberculosis infection in students.

In order to test this hypothesis, an analysis was made of the records of 100 patients admitted to the hospital during 1937–38 with other diagnoses and later found to have significant tuberculosis. Clinical information on each of these patients was then correlated with his location in the hospital and the number of days before diagnosis was established. The authors believed that many other cases of tuberculosis which had never been diagnosed were in the hospital at this time. Approximately 30,000 patients were admitted to the hospital during this period, and the 100 cases which were studied would represent only about one-fourth of the number of tuberculosis patients that would have been expected on the basis of Plunkett's study, which has already been discussed.

The records of the 100 patients were studied to determine the length of time hospital personnel were exposed to the disease before diagnosis was established. It was found that a total of 1,497 hospital days had been spent on the various hospital wards before transfer to the tuberculosis ward; the actual number of days before transfer ranged from 1 to 146 days with a median of 8 days. Eighty-one percent of these patients had advanced tuberculosis at time of diagnosis and 60 percent had positive sputum. Seventy-nine percent were men with a median age of 54; 21 percent were women with a median age of 33.

The authors concluded from these findings that every patient with sputum should have examinations for tuberculosis, including X-ray and laboratory study. The conclusions were also reached that (1) if all adult patients admitted to the general hospital were X-rayed, much tuberculosis would be discovered, and (2) unrecognized cases of tuberculosis create a significant public health problem since they constitute a hazard to hospital personnel and other patients.

In 1947, Scatchard and Duszynski (*9*) reported on the program which was begun in 1944 in Meyer Memorial Hospital as a result of Farber and Clark's work.

Ten thousand examinations were made between July 8, 1944 and November 12, 1945. The uncorrected figure for previously unsuspected tuberculosis was found to be 3.7 percent, and 1.8 percent were proven to have the disease by sputum examination or autopsy. In one group of 3,000 examinations, 63 cases of tuberculosis were discovered. A review of 49 of these cases revealed that 5 did not have active tuberculosis, 9 had positive sputum, 8 had proven tuberculosis on necropsy; 5 were transferred at once to the tuberculosis division and proven there; the remaining 22 were inadequately studied. The authors stated in their summary that in their opinion at least 2.5 percent of the new patients studied had pulmonary tuberculosis, and that, in addition, a large number of patients had other lesions which needed further study and care.

Grasslands Hospital, Valhalla, N. Y.

Childress, Debbie, and Harmon (*10*) reported on a demonstration at the Grasslands Hospital, Valhalla, N. Y., extending over a period of 18 months from July 1, 1941, to January 1, 1943. This program was financed by the Grasslands Hospital, the Westchester Tuberculosis Association, and the Westchester County Department of Health. The purpose of the program was to study and demonstrate the yield of tuberculosis cases which would be expected by routine chest X-ray or fluoroscopic examination of patients admitted to the hospital and to the outpatient department, who were not suspected of having pulmonary disease and would not be customarily examined by X-ray. Persons under treatment for pulmonary and cardiac disease who would have received such an examination were omitted from the study.

Clinic patients were examined by fluoroscope, and X-rays were made if it was considered necessary; 14- by 17-inch X-rays were made of hospital patients. Fluoroscopies were done by physicians in the tuberculosis and X-ray departments, and the films were interpreted by the roentgenologist and physician in charge. Most of the cases were studied by the physician on the tuberculosis service.

Table 1. *Tuberculosis in general hospital patients, Grasslands Hospital, Valhalla, N. Y., July 1, 1941–Jan. 1, 1943, as revealed by X-ray examination of hospital admissions*

Patients	Number	Percent
Admitted to hospital	9,693	100
Examined	7,187	74
Showing tuberculosis by X-ray	290	4
Showing evidence of reinfection disease	201	2.8

Evidence of manifest tuberculosis was present in 290, or 4 percent of the cases, and 201, or 2.8 percent, showed evidence of reinfection disease. Of the total, 42, or 0.6 percent, were classified as active or questionably active; 3, active primaries.

This program was considered an extension of one already in operation for employees and medical and nursing student. The authors concluded (1) that although tuberculosis case-finding programs among various sections of the population have increased the opportunity for finding tuberculosis, the general hospital X-ray equipment has not been fully utilized, and (2) that by discovering previously unrecognized tuberculosis among the patients, better protection is offered the hospital worker through the isolation and treatment of infectious cases.

Flushing Hospital, Flushing, N. Y.

Epstein and Meliss (*11*) reported on a program conducted in Flushing Hospital, Flushing, N. Y., August 1944–July 1945, in cooperation with the Queensboro Tuberculosis and Health Association. A total of 3,487 persons were X-rayed: 112, or 3.2 percent, had reinfection type tuberculosis; 21, or 0.6 percent, showed evidence of active disease; and 13, or 0.37 percent, were not suspected before being X-rayed.

University of Chicago Clinics, Chicago, Ill.

Bloch and Tucker (*12*) reported on the experience in the University of Chicago clinics where routine fluoroscopy of the chest of all patients, regardless of the nature of their complaints, has been an accepted procedure since 1942. The first 15,000 examinations produced a total of 626 persons, or 4.17 percent, who were found to have tuberculous lesions of the reinfection type; 1.43 percent had lesions which were considered clinically important. The findings in the various clinics, classified as to clinical importance, are given in the following table.

Table 2. *Tuberculosis by clinical importance, found on routine fluoroscopy of 15,000 patients at the University of Chicago clinics. 1942–44*

	460 cases in chest clinics	14,540 cases in other clinics
	Percent	*Percent*
Clinically important	17.8	0.9
Clinically unimportant	13.0	2.4
Total tuberculosis	30.8	3.3

The findings in the University of Chicago clinics were compared with those of a previous study made by Bloch, et al. (*13*) in Chicago of 25,000 Negroes who were examined at Provident Hospital where, since 1939, chest fluoroscopy has been provided for all clinic patients regardless of their complaints. In this group tuberculosis other than primary infection was found in 4 percent of the total number examined, and 2.6 percent had a clinically important disease. The findings in the two groups are compared in table 3.

The authors estimated from this experience that in the United States 600,000 persons with active pulmonary tuberculosis come under medical treatment each year for some other complaint without the lung involvement being recognized.

Table 3. *Tuberculosis by clinical importance found by fluoroscopy, in University of Chicago clinics 1942–44, and in Provident Hospital clinics 1939–44, Chicago, Ill.*

	15,000 cases, University of Chicago clinics		25,000 cases, Provident Hospital clinics	
	Number	Percent	Number	Percent
Clinically important	215	1.43	660	2.64
Clinically unimportant	411	2.74	339	1.36
Total tuberculosis	626	4.17	999	4.00

Private and Public General Hospitals, Metropolitan New York

A study of necropsies in private and public general hospitals in metropolitan New York reported by Medlar (*14*) in 1947 adds to the evidence concerning the numbers of unrecognized cases of tuberculosis in hospitals. The decrease in death rate from tuberculosis during the past 25 years led Medlar to study the validity of the assumption that the incidence of pathologically significant tuberculosis discovered on necropsy would show a similar trend during the same period; as a byproduct of the study, the incidence of unrecognized tuberculosis in general hospitals was considered.

Table 4. *Tuberculosis found on reports of necropsies on patients in metropolitan New York hospitals during 1916–20, and 1940–45; and Medical Examiner's Department of the Borough of Manhattan in 1943*

Necropsy reports studied	Total	Showing evidence of tuberculosis	
		Number	Percent
Total	5, 594	898	16.0
Males	3, 657	654	17.9
Females	1, 937	244	12.6

The material for this study included reports on 14,719 necropsies in private and public general hospitals in metropolitan New York during a 5-year period from 1916–20 and a 6-year period from 1940–45, and also reports on 1,177 necropsies from the Medical Examiner's Department of the Borough of Manhattan for persons who met with sudden death during 1943.

The incidence of significant disease in adults who died in hospitals was found to be approximately the same during the two periods. Pathologically significant tuberculosis seemed to have been recognized clinically in a high proportion of cases below 40 years of age, but in the older age groups, tuberculous infection was frequently not recorded either as the chief or the contributing cause of death even if cavity formation and pathologically active disease were proven. A total of 117 unrecognized cases of active disease were found, 95 percent of them in persons over 50 years of age; no marked difference was found in the incidence in males and females up to 30 years of age, but the rates were higher in males in the older age groups.

Medlar concluded that all persons over 50 years of age, especially males, should have a chest X-ray. Careful study of persons whose X-rays show questionable lesions should be made, including serial roentgenograms and laboratory study, regardless of the impression of importance shown.

The above reports on the incidence of unrecognized tuberculosis in general hospitals indicate that X-ray evidence of tuberculosis has been found in from 2.6 to 8.1 percent of cases admitted to hospitals. Information on the number of proven cases is not presented in all reports, but the rates reported vary from 0.6 to 1.8 percent. These figures are not entirely comparable since the method of classifying cases and the procedures used to determine the diagnosis were not the same in all institutions. Table 5 is presented for general comparison of the incidence of tuberculosis in some of the hospitals studied.

Table 5. *Tuberculosis discovered in 6 general hospitals with routine admission X-ray programs*

Name of hospital and year	Percent of patients with reinfection tuberculosis	Percent of patients with active tuberculosis
University Hospital, Ann Arbor, Mich. (11 days, 1935)	8.1	1.0
Up-State New York, 14 hospitals (1937–38)	2.6	1.1
Meyer Memorial Hospital, Buffalo, N. Y. (July 8, 1944–Nov. 12, 1945)	3.7	1.8
Grasslands Hospital, Valhalla, N. Y. (July 1, 1941–Jan. 1, 1943)	2.8	.6
Flushing Hospital, Flushing, N. Y. (Aug. 1944–July 1945)	3.2	.6
University of Chicago clinics, Chicago, Ill. (1942–44)	4.2	1.4

Programs in Operation

Reports from University Hospital, Ann Arbor, Mich., and the Wisconsin, and New York State departments of health mention some procedures which may be applicable to other hospitals.

University Hospital, Ann Arbor, Mich.

A program of routine X-ray of hospital admissions was instituted in University Hospital in 1941 and has continued without interruption since that time. X-ray equipment is located near the admission desk and an attempt is made to X-ray every person who is admitted. Personnel employed include one technician who operates the machine and processes the films, one radiologist to interpret films (about 30 minutes daily) and to supervise the equipment and operation, and one stenographer to compile and distribute reports. Films are read at a specified hour each day and the reports on questionable cases are sent as soon as possible to the ward on which the patient is located. The cooperation and interest of the hospital staff is mentioned in reports, but no reference is made to referral or to cooperative plans with the health department. In January 1947, a tuberculosis control officer was appointed in University Hospital to have major responsibility for the program and "to expedite more efficient investigation of all hospital registrations, more rapid handling of infectious cases, and prompt and complete X-ray of hospital employees (*15*)."

Wisconsin State

Filek (*16*) describes a program begun in Wisconsin in 1946, when two general hospitals were provided with X-ray equipment through the cooperation of the State board of health. The writer indicated that expansion of the program would be limited by the fact that only hospitals with over 300 beds were eligible for full photofluorographic equipment, and Wisconsin had only 3 hospitals of that size. Hospitals with 100 to 300 beds were eligible for partial equipment, however, and the author reported that 4 such hospitals had requested it.

When the program began in Wisconsin, reports on small films only were sent to the State board of health, but space was later provided in the form to include the 14- by 17-inch X-ray film reading as well. Emphasis is placed on the importance of health department participation in the program as a part of the total community tuberculosis program. The health officer and other health department personnel share responsibility for interpretation of the program in the community.

Histories of individuals with questionable lesions are referred to the health department with recommendations for medical and public health nursing follow-up. Interpretation of diagnosis and the education of the patient in the hospital are mentioned as influencing the patient's acceptance or rejection of diagnosis and treatment. Filek suggests that one person in the hospital be made responsible for the program in the institution. He refers to the need for understanding on the part of hospital personnel of the public health facilities and program, and adds that there should be a continuity of interest in the patient if the most effective service is to be rendered to the patient and the community.

New York State

A State-wide program in New York is sponsored by the New York State Department of Health in cooperation with general hospitals; all nonprofit public or private general hospitals are eligible to participate.

Hospitals which have an annual admission rate sufficiently large to guarantee a minimum of 4,000 admission chest X-rays of adults are eligible for the loan of equipment and also for payments of 50 cents for each report of admission X-rays submitted. Hospitals which do not have high enough admission rates to qualify for the loan of equipment may participate by using their own equipment. They receive $1 for each report submitted. Requests from the larger hospitals are given priority in the loan of equipment.

Hospitals which elect to participate in the program submit a formal application, in which they agree to X-ray the chests of all admitted patients 15 years of age or over, and of all employees; to provide for interpretation of X-rays; to make no charge for either the initial X-ray or for later X-rays necessary for diagnosis of tuberculosis; to make such X-ray and sputum examinations as may be indicated for persons whose initial X-ray shows definite or suspected tuberculosis; and to permit representatives of the State health department to observe, advise, and consult with the hospital in the program. The application also provides for reporting all X-rays taken under the program, and complying with State regulations for reporting tuberculosis cases.

Before the application is approved, the health officer in whose jurisdiction the hospital is situated works with the hospital representatives on plans for the program. Representatives of the State division of tuberculosis are available for consultation where indicated and may visit the hospital to review technical arrangements before approvals are issued.

The health officer is also charged with responsibility for the follow-up of previously unknown cases of definite or suspected tuberculosis. Care of cases of nontuberculous pathology vary with local policies and procedures. Public health nurses make the necessary visits to arrange for diagnostic services or give patient care.

Hospitals in New York are encouraged to use the services of the local tuberculosis control officer or the staff of the local tuberculosis hospital for the interpretation of films and for consultation on special cases. They are also requested, insofar as possible, to complete the diagnosis before the patient leaves the hospital and are asked to exercise caution "not to disturb patients by isolating them unless there is definite evidence of active tuberculosis."

Discussion

The effectiveness of routine chest X-ray examination of all hospital admissions has been adequately demonstrated. The incidence of tuberculosis has been found to be higher among persons who enter the hospital than among the general population. Considering that approximately 16,000,000 persons are admitted to general hospitals each year, it is evident that a significant number of tuberculosis cases could be found if all 16,000,000 were to have chest X-rays. The advantage to the hospital in protection of personnel, as well as to the community and to the individuals concerned, cannot be discounted.

The fact remains, however, that most patients do not have routine X-rays when they are admitted to general hospitals. Oatway (*17*) conducted a survey in September 1948 to find out what proportion of the general hospitals in the United States had programs of routine chest X-ray for patients on admission. Information that he gathered from State health departments and other correspondents indicated that at that time only 247 of the 4,539 general hospitals in this country had programs in action. Oatway found that other hospitals had equipment or plans to start programs, but few hospitals reported that all of their patients were included in these "routine" procedures.

Financial considerations undoubtedly account for the failure of many hospitals to undertake such programs. Help from the State health department in providing X-ray equipment, such as reported by New York and Wisconsin, is a reasonable way to relieve the hospital of part of the cost of a procedure which has public health significance. Oatway found that voluntary groups gave valuable assistance.

Even when the equipment is available, X-raying every patient who is admitted to the hospital gives rise to administrative problems which may deter hospitals from trying such a plan. Not only must a technician be at hand to make the X-rays, but appointments must be scheduled for those patients who cannot, because of acute illness, be X-rayed on admission. The films must be read every day. Records must be kept. Provision must be made for whatever services are needed to establish a diagnosis. Patients must be notified of the results—sometimes after they have left the hospital. Interpretation must be made to patients, so that they will understand the follow-up that may be necessary. Appropriate reports must be sent to the health department.

These new duties require the understanding and collaboration of the hospital staff. In some larger hospitals it may be necessary to add new persons to the staff, but whether that is done or not, the admission chest X-ray program cannot be carried on in the radiography department alone. It requires the conscious effort of everyone responsible for service to patients.

Hospitals which operate chest X-ray programs as part of their routine admission procedure, and have dealt with the administrative perplexities, could do a service to tuberculosis case finding by sharing experience with others.

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Studies on Experimental Histoplasmosis

I. A Report on Intracerebral Inoculations of Male dba Line 1 Mice

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One of the constantly recurring problems in the study of histoplasmosis is the lack of a laboratory animal which is consistently susceptible to the causative organism, *Histoplasma capsulatum* (*1–6*). Tager and Liebow (*4*) have pointed out, however, that in most of the studies reported in the literature, such factors as age, strain of animal, weight at inoculation, and other causes of variation have not been adequately controlled.

With this in mind, the authors investigated the susceptibility of a number of strains of mice by various routes of inoculation. In addition, several strains of the fungus were studied. In the present report, it will be demonstrated that uniformly successful results can be obtained by inoculating a specified strain of mice by a single route of injection utilizing a particular strain of *Histoplasma.*

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Materials and Procedures

The mice used were males of the dilute brown strain, dba line 1, obtained from the Roscoe B. Jackson Memorial Laboratory, Bar Harbor, Maine. Mice 4 to 5 weeks old, weighing 10 to 18 grams, were used throughout. Altogether, 7 experiments were carried out over a period of 10 months; a total of 272 animals were studied. Each mouse was inoculated with 0.02 ml. of a given dilution of a saline suspension of the yeast phase of the fungus or 0.02 ml. of saline alone, intracerebrally. The strain of *Histoplasma* employed was obtained in 1948 from Dr. Norman F. Conant, Duke University School of Medicine. He stated that it had been isolated from a fatal case of human histoplasmosis observed in Cincinnati in 1947 by Dr. Isaac Ruckman (7). Since its receipt by the authors, this culture, has been maintained in the yeast phase by a series of consecutive subcultures transferred on brain heart infusion blood agar slants, sealed with paraffin and incubated at 37° C., at intervals sufficiently close together to maintain viable organisms.

The inoculum was prepared from 5-day-old yeast phase cultures of the fungus. The growth was washed from the slants with sterile physiological saline. One cc. of this suspension was centrifugalized at 2,000 r.p.m. for 20 minutes to determine the original concentration of the suspension. The remainder was then adjusted in order to produce a 1/100 suspension of organisms in physiological saline.

The mice were weighed on the date of inoculation and at intervals thereafter up to the 30th day after inoculation, at which time any surviving mice were sacrificed. Complete autopsies were performed on all mice, both those that died spontaneously and those that were sacrificed.

At autopsy a portion of the brain and a portion of the spleen were removed from each mouse for the preparation of smears and cultures. Smears were stained with Giemsa's stain. Cultures were made on brain-heart infusion blood and potato dextrose agar plates, to each of which had been added 40 units of penicillin and 40 units of streptomycin per ml. of media. All cultures were incubated at room temperature. In addition, sections prepared from Zenker-fixed material and stained with hematoxylin and eosin and Goodpasture's stain were prepared from all tissues from all animals in four of the seven experiments.

After inoculation of the mice, serial dilutions were prepared from the 1/100 suspension of the organisms. Two-hundredths of a milliliter of a 1/1,000,000 and/or 1/10,000,000 dilution were then cultured on each of 10 brain heart infusion blood agar plates which were incubated at room temperature. From the colony counts obtained from these plates, an approximation of the number of viable organisms actually injected was calculated. While it might have seemed advisable to calculate the dosage of organisims by direct hemacytometer count, this method gives no idea as to the viability of the organisms being introduced. Since, in any infection, the viable organisms are most important, it was felt that plate counts would be a much more accurate method of estimating the number of organisms capable of producing infection than the total number of organisms injected.

Findings

The dosages employed and the percentage of fatalities which followed are presented separately for each experiment in table 1. It should be pointed out that in this series of seven experiments, in every

Table 1. *Results, in terms of mortality, obtained in a series of experiments in which male dba line 1 mice were injected intracerebrally with saline suspensions of the yeast phase of a single strain of* Histoplasma capsulatum *at different dose levels*

Experiment number	Date of injection	Dilution employed	Estimated dose per injection in thousands of organisms	Animals				
				Total number (100 percent)	Died before 30th day after injection		Sacrificed on 30th day after injection	
					Number	Percent	Number	Percent
I	Jan. 18, 1949	1/100	319	3	3	100.0	--------	--------
II	Mar. 17, 1949	1/100	339	5	4	80.0	1	20.0
		1/200	169	5	5	100.0	--------	--------
		1/400	85	5	5	100.0	--------	--------
		1/800	42	5	5	100.0	--------	--------
		Saline	0	5	--------	--------	5	100.0
III[1]	--------	--------	--------	--------	--------	--------	--------	--------
IV	May 27, 1949	1/100	88	5	5	100.0	--------	--------
		1/200	44	6	6	100.0	--------	--------
		1/400	22	6	6	100.0	--------	--------
		1/800	11	6	4	66.7	2	33.3
		1/1600	6	6	4	66.7	2	33.3
		1/3200	3	6	1	16.7	5	83.3
		1/6400	1	6	4	66.7	2	33.3
		Saline	0	4	--------	--------	4	100.0
V	June 16, 1949	1/200	263	5	5	100.0	--------	--------
		1/400	131	5	5	100.0	--------	--------
		1/800	66	5	5	100.0	--------	--------
		1/1600	33	5	--------	--------	5	100.0
		Saline	0	5	--------	--------	5	100.0
VI	July 22, 1949	1/500	76	9	3	33.3	6	66.7
		1/1000	38	10	4	40.0	6	60.0
		1/2000	19	10	2	20.0	8	80.0
		Saline	0	7	--------	--------	7	100.0
VII[2]	--------	--------	--------	--------	--------	--------	--------	--------
VIII	Sept. 28, 1949	1/100	2,177	23	23	100.0	--------	--------
		1/400	541	23	23	100.0	--------	--------
		1/800	272	23	23	100.0	--------	--------
		1/1600	136	23	23	100.0	--------	--------
		Saline	0	9	--------	--------	9	100.0
IX	Nov. 14, 1949	1/100	1,546	10	10	100.0	--------	--------
		1/600	257	10	10	100.0	--------	--------
		1/3600	43	10	10	100.0	--------	--------
		Saline	0	7	--------	--------	7	100.0
Total number of animals[3]		Injected with a suspension of *Hiistoplasma*.		235	198	84.3	37	15.7
		Injected with saline alone		37	--------	--------	37	100.0

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[1] No dba males were included in this experiment.

[2] All animals in this experiment died within a week of injection immediately following a fire in the laboratory.

[3] 3 animals, 2 injected with a suspension of *Histoplasma* and 1 with saline alone, were not included in the above tabulation, because death intervened within 18 hours of the time of injecting.

group injected with *Histoplasma*, regardless of dose, one or more animals died spontaneously. Furthermore, in order to provide a control group, some animals were injected with saline alone in each of the last six experiments; none of these died.

The results of these experiments were then pooled; and, after examination of the data, appropriate groupings by dose were made. Scrutiny of the results following various doses indicated that any injection of 500,000 or more organisms gave effects so similar that all doses of this magnitude were combined. However, for various reasons, which will be explained later, it became apparent that the animals in experiments V and VI did not behave in a manner exactly similar to those in the other experiments. Therefore, the results of these two experiments will be presented separately. The pooled results of the remainder of the experiments, with respect to mortality, are presented in table 2.

Table 2. *Comparative mortality observed among male dba line 1 mice within 30 days of intracerebral injection with varying doses of* Histoplasma capsulatum

Estimated dose per injection in thousands of organisms	Total number (100 percent)	Died before 30th day after injection		Sacrificed on 30th day after injection	
		Number	Percent	Number	Percent
Over 500	56	56	100.0	—	—
400–499.9	—	—	—	—	—
300–399.9	8	7	87.5	1	12.5
200–299.9	33	33	100.0	—	—
100–199.9	28	28	100.0	—	—
20–99.9	37	37	100.0	—	—
Subtotal	162	161	99.4	1	.6
1–19.9	24	13	54.2	11	45.8
Total	186	174	93.5	12	6.5
0 (saline only)	25	—	—	25	100.0

In this series of experiments, excluding V and VI, any dose of 20,000 or more organisms of this strain of *Histoplasma* suspended in saline and administered to dba line 1 males, 4 to 5 weeks of age, by the intracerebral route, resulted in fatality in practically 100 percent of the cases. Of 162 mice so treated, 161, or 99.4 percent, died spontaneously before the 30th day after injection; only 1 mouse lived until the sacrifice date. On the other hand, of the 24 animals that received less than 20,000 organisms, only 13, or 54.3 percent, died. Furthermore, from table 1, it can easily be seen that this did not depend on the results of a single low dose employed in one experiment alone. In every group receiving less than 20,000 organisms, more than one animal survived.

There appears to be some further evidence that a dose of approximately 20,000 organisms of this strain of *Histoplasma* under the experimental conditions imposed is not far from the minimal lethal dose. For example, of the six animals which received this dose, two survived beyond the 20th day. In contrast to this, of the 21 animals receiving the next highest dose (approximately 43,000 organisms), only 1 animal survived past the 14th day. This animal died on the 18th day. Thus it would appear highly probable that intracerebral injection of 40,000 viable organisms of a virulence comparable to that of this strain is regularly lethal for dba line 1 male mice.

Another approach which is frequently employed in attempting to assess the lethal effect of various doses of an organism on a given animal is a determination, for each dose level, of the time at which a specified proportion of the animals may be expected to die. Cumulative death curves by day are given in table 3 for each dose. Although it is apparent that differences do exist, even among the dose groups which eventually produced 100 percent fatality, it can readily be seen that the difference between those receiving less than 20,000 organisms and any dose higher than this is far greater than any of the differences among groups which received higher doses. Since only 54 percent of those receiving less than 20,000 organisms died, the only variable which can be used for comparison in this regard is the day on which it

Table 3. *Cumulative mortality observed among male dba line 1 mice within 30 days of intracerebral injection with varying doses of* Histoplasma capsulatum

Day during which death occurred	Estimated dose per injection in thousands of organisms [1]											
	500 and over		300-399.9		200-299.9		100-199.9		20-99.9		Under 20	
	Cumulative spontaneous deaths											
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
3	------	------	------	------	------	------	------	------	------	------	------	------
4	1	1.8	1	12.5	------	------	------	------	------	------	------	------
5	8	14.3	2	25.0	1	3.0	1	3.6	3	8.1	------	------
6	16	28.6	2	25.0	4	12.1	2	7.1	7	18.9	5	20.8
7	35	62.5	2	25.0	11	33.3	6	21.4	8	21.6	7	29.2
8	45	80.4	5	62.5	20	60.6	8	28.6	12	32.4	9	37.5
9	51	91.1	5	62.5	27	81.8	14	50.0	17	45.9	9	37.5
10	55	98.2	6	75.0	31	93.9	19	67.9	25	67.6	9	37.5
11	56	100.0	7	87.5	32	97.0	25	89.3	31	83.8	9	37.5
12	56	100.0	7	87.5	33	100.0	27	96.4	33	89.2	10	41.7
13	56	100.0	7	87.5	33	100.0	27	96.4	33	89.2	10	41.7
14	56	100.0	7	87.5	33	100.0	27	96.4	34	91.9	11	45.8
15	56	100.0	7	87.5	33	100.0	27	96.4	34	91.9	11	45.8
16	56	100.0	7	87.5	33	100.0	27	96.4	34	91.9	11	45.8
17	56	100.0	7	87.5	33	100.0	27	96.4	34	91.9	11	45.8
18	56	100.0	7	87.5	33	100.0	28	100.0	35	94.6	11	45.8
19	56	100.0	7	87.5	33	100.0	28	100.0	35	94.6	12	50.0
20	56	100.0	7	87.5	33	100.0	28	100.0	36	97.3	12	50.0
21	56	100.0	7	87.5	33	100.0	28	100.0	37	100.0	12	50.0
22	56	100.0	7	87.5	33	100.0	28	100.0	37	100.0	12	50.0
23	56	100.0	7	87.5	33	100.0	28	100.0	37	100.0	12	50.0
24	56	100.0	7	87.5	33	100.0	28	100.0	37	100.0	12	50.0
25	56	100.0	7	87.5	33	100.0	28	100.0	37	100.0	13	54.2
26	56	100.0	7	87.5	33	100.0	28	100.0	37	100.0	13	54.2
27	56	100.0	7	87.5	33	100.0	28	100.0	37	100.0	13	54.2
28	56	100.0	7	87.5	33	100.0	28	100.0	37	100.0	13	54.2
29	56	100.0	7	87.5	33	100.0	28	100.0	37	100.0	13	54.2
30	56	100.0	7	87.5	33	100.0	28	100.0	37	100.0	13	54.2
Total mice injected	56	100.0	8	100.0	33	100.0	28	100.0	37	100.0	24	100.0

[1] No mice were given estimated doses of 400-499.9 thousand organisms.

was observed that 50 percent of the animals had died. As a matter of fact, the time required to kill 50 percent of the mice follows a very clearly defined pattern from high to low dosage with a marked change in the survival time between those receiving 20,000 or more organisms and those receiving less than this amount. Fifty percent of those animals receiving 500,000 or more organisms were dead by the end of the 7th day. Among those receiving 300,000 to 399,999 organisms, and also the next lower dose, this point was reached between the 7th and 8th days. At the dose level of 100,000 to 199,999, the mortality reached 50 percent between the 8th and 9th days; and in the next lowest group (the lowest completely lethal dose) 50 percent died by the 10th day. However, when doses of under 20,000 organisms were given, it was not until the 19th day that 50 percent of the animals were dead.

It was noted throughout the course of the experiments that, even though the mice used were inbred and all of the same age, the weights of the individual animals at the time of inoculation varied considerably. Further, the extent of the variation and the average weights differed from one lot of animals to another. For example, the weights of the mice employed in experiment IV ranged from 12 to 19 grams, with well over one-half of the animals weighing 16 grams or more; whereas in experiment VIII the weights of the animals ranged from 10 to 17 grams with over one-half of the animals weighing 13 grams or less. In still another experiment, on the other hand, the mice varied over a comparatively short range (11 to 16 grams) with the greatest number occurring at about the midpoint, 14 grams.

Unfortunately, the percentage distribution of the mice by weight

Table 4. *Comparison of observed mortality among male dba line 1 mice given intracerebral injections of saline alone, of* Histoplasma capsulatum *in doses of less than 20,000 organisms, and of* Histoplasma capsulatum *in doses of 20,000 or more organisms according to weights of animals at time of injections*

Weight in grams at time of injection	Saline alone,[1] total number (100 percent)	Under 20,000 organisms					20,000 organisms and over				
		Total number (100 percent)	Died before 30th day after injection		Sacrificed on 30th day after injection		Total number (100 percent)	Died before 30th day after injection		Sacrificed on 30th day after injection	
			Number	Percent	Number	Percent		Number	Percent	Number	Percent
9.0-9.9	1	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
10.0-10.9	1	-------	-------	-------	-------	-------	8	8	100.0	-------	-------
11.0-11.9	1	-------	-------	-------	-------	-------	18	18	100.0	-------	-------
12.0-12.9	1	1	-------	-------	1	100.0	22	22	100.0	-------	-------
13.0-13.9	6	2	1	50.0	1	50.0	34	34	100.0	-------	-------
14.0-14.9	4	2	1	50.0	1	50.0	36	36	100.0	-------	-------
15.0-15.9	5	3	2	66.7	1	33.3	20	20	100.0	-------	-------
16.0-16.9	1	9	5	55.6	4	44.4	10	9	90.0	1	10.0
17.0-17.9	4	6	3	50.0	3	50.0	9	9	100.0	-------	-------
18.0-18.9	1	1	1	100.0	-------	-------	4	4	100.0	-------	-------
19.0-19.9	-------	-------	-------	-------	-------	-------	1	1	100.0	-------	-------
Total number of animals	25	24	13	54.2	11	45.8	162	161	99.4	1	.6

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[1] All mice given injections of saline alone were sacrificed on the 30th day.

at time of inoculation was not the same for those animals that received under 20,000 organisms and those that received 20,000 or more organisms. However, it can be seen from table 4 that there is no evidence that this introduced a bias which would invalidate the mortality rates quoted for these two groups. For starting weights 13, 14, 15, 16, and 17 grams, respectively, more than one mouse was included in both dose groups. In every case those receiving 20,000 or more organisms showed a higher death rate than animals receiving less than 20,000, and these differences are statistically significant. Still more important is the fact that the differences in death rates were of the same order of magnitude regardless of initial weight.

All animals were examined at autopsy for gross lesions. Sections were prepared for microscopic examination from the tissues of the 61 mice in experiments II and IV. However, through clerical error, the sections prepared from one of these mice were not available for study.

Although in no animal in any experiment were any gross lesions noted, most of the animals from which tissue sections were prepared showed lesions in the brain, liver, and spleen. In the brain, a granulomatous meningitis of varying intensity was almost a constant finding; in a few instances the process extended into the spinal cord. In the liver the typical lesion observed was patchy necrosis of parenchymal cells, and in the spleen, a reticulo-endothelial hyperplasia which

Table 5. *Findings on microscopic examination of tissue sections taken at autopsy from male dba line 1 mice injected intracerebrally with varying doses of* Histoplasma capsulatum *or with saline only*

Estimated dose per injection in thousands of organisms	Total number of mice (100 percent)	Mice in which lesions were—				Mice in which organisms were—					
		Observed		Not observed		Present		Questionably present		Absent	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
					DIED SPONTANEOUSLY						
Under 20	12	12	100.0	-------	-------	11	91.7	1	8.3	-------	-------
20–99.9	27	[1] 24	88.8	3	11.2	24	88.8	-------	-------	3	11.2
100–199.9	5	5	100.0	-------	-------	5	100.0	-------	-------	-------	-------
200–299.9	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
300–399.9	4	4	100.0	-------	-------	4	100.0	-------	-------	-------	-------
					SACRIFICED						
Under 20	11	7	63.6	4	36.4	3	27.3	3	27.3	5	45.4
20–99.9	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
100–199.9	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
200–299.9	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
300–399.9	1	-------	-------	1	100.0	-------	-------	-------	-------	1	100.0
					CONTROL ANIMALS						
Saline alone	9	-------	-------	9	100.0	-------	-------	-------	-------	9	100.0

[1] There were no sections of liver in 2 mice and no section of spleen in 1 mouse.

ranged from slight to marked. The only other organ in which abnormalities were noted was the heart. Tiny areas of fibrosis were seen in the heart of one mouse that had been injected with less than 20,000 organisms and which was sacrificed on the 30th day. Necrosis of the myocardial fibrils was observed in one mouse injected with 20,000 to 99,999 organisms, which died on the 11th day after injection. Similar myocardial necrosis was seen in one control animal.

A comparison of the proportion of animals in which lesions could be seen on microscopic examination among 48 mice which died with that among 12 which were sacrificed shows that 45 of the 48 had lesions as compared with 7 of the 12. All 3 of the former group which showed no lesions had received an injection of 20,000 to 99,999 organisms. Each of them had shown a loss in weight comparable to others in the group and positive cultures were obtained from tissues removed at autopsy of two. (Cultures of the brain and spleen of the remaining animal were contaminated.) One of the five mice which showed no lesions in the latter group had received an injection of 300,000 to 399,999 organisms. Although *Histoplasma* was recovered from this mouse, its weight curve suggested that infection may have occurred but that the animal had recovered spontaneously.

In one dose group, the number of animals that died was approximately equal to the number sacrificed, so that a comparison of the severity of the lesions was possible. As was to be expected, the degree of severity of the lesions was greater among those that died spontaneously than among those that were sacrificed, even though the number of animals exhibiting lesions in the three major sites did not differ widely; and, in practically all animals that showed lesions microscopically, the brain, liver, and spleen were all involved.

Among 48 mice which died, 45 had lesions which could be seen on microscopic examination. In contrast, only 7 of the group of 12 mice which was sacrificed showed lesions.

As has already been mentioned, all mice were weighed at the time of injection and periodically thereafter until they died or were sacrificed. The interval between weighings was made shorter in the later experiments with the hope of obtaining a more precise index of the effect of various doses of *Histoplasma* on the animal. This possibility was suggested by the very obvious difference between the controls and the animals injected with the fungus, the former progressively gaining and the latter losing weight, at least in the days immediately following injection.

It was noted, however, that the rate of weight loss in the experimental animals was to some extent influenced by the initial weights, in that the initially heavier mice lost not only an absolutely greater amount but also a larger proportion of their initial weight. Because of the differences in initial weights among the various dose groups, it was necessary to take this relationship into account in comparing the patterns of weight change from one group to another. To accomplish this, the line of regression of percent weight loss on initial weight was estimated for each day after injection on which animals were weighed. The observed percent lost by each mouse was then adjusted by means of the slope of this line to correspond to that expected of an animal initially weighting 14 grams. An adjusted weight in grams was determined from this percentage.

The means of the adjusted weights of the mice in each dose group on each day after treatment are given separately in table 6 for animals which died spontaneously and for those which were sacrificed. Except for controls and the sacrificed animals in the group receiving less than 20,000 organisms, values are not given beyond the 11th day because of the small number surviving.

Examination of table 6 immediately reveals the sharp contrast between the rising weights of control animals and the decline of those in the experimental groups. Differences by dose among the various experimental groups, however, are less clear. The loss of weight continued throughout the first 8 to 10 days at about the same rate regardless of dose. There is some indication of a delay in the start of this loss among the mice that survived to be sacrificed following the dose of less than 20,000 organisms, but the evidence is not overwhelming. There is also some slight appearance of an increasing rate of loss of weight with increasing dose, but this is even less marked and could not be demonstrated statistically. However, it is worth noting that the decrease in mean weight within 8 days was more than 4 grams in every group except that sacrificed 30 days after doses of less than 20,000 organisms. In the latter group, the mean weight

Table 6. *Mean weights*[1] *in grams of groups of male dba line 1 mice at the time of and following intracerebral injection with* Histoplasma capsulatum

Days after injection	Died before 30th day after injection										Sacrificed on 30th day after injection			
	Estimated dose per injection in thousands of organisms													
	Less than 20		20–99.9		100–199.9		200–299.9		500 or more		Less than 20		Saline alone	
	Number of mice	Mean adjusted weight	Number of mice	Mean adjusted weight	Number of mice	Mean adjusted weight	Number of mice	Mean adjusted weight	Number of mice	Mean adjusted weight	Number of mice	Mean adjusted weight	Number of mice	Mean adjusted weight
0	13	16.22	27	15.84	23	12.97	33	13.82	56	13.13	11	15.92	28	13.47
2	------	------	10	12.13	23	12.03	33	12.46	56	11.63	------	------	28	13.51
4	13	14.65	27	14.21	23	11.77	33	12.30	55	10.81	11	15.75	32	14.16
6	------	------	19	11.27	26	9.25	29	9.64	43	8.63	------	------	33	14.33
7	6	11.32	11	10.49	------	------	------	------	------	------	11	13.32	------	------
8	------	------	6	9.85	17	8.83	16	9.06	10	8.28	------	------	28	14.39
10	------	------	------	------	7	7.94	------	------	------	------	------	------	23	14.31
11	4	10.90	------	------	------	------	------	------	------	------	11	12.74	------	------

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[1] Weights adjusted for differences in rate of loss associated with differences in initial weights.

loss within 8 days was 2.6 grams. The controls gained an average of 0.9 grams within the same period of time. This observation suggests an additional criterion whereby the presence or absence of infection can be judged.

It has been previously noted that the animals in experiments V and VI did not behave in a manner similar to the others. For example, in experiment V (table 1), while each of the animals which received a dose of 100,000 to 299,999 died, 2 survived to the 22d and 23d day, respectively; whereas, among the animals that received this dose in other experiments in the series, only one animal survived beyond the 12th day, and it died on the 18th day (table 3). Furthermore, of 10 animals in this experiment which received a dose of 20,000 to 99,999 organisms, only 5, or 50 percent, died spontaneously, in contrast to the 100 percent mortality observed following this dose in the other experiments. Thus it appeared that some loss of virulence in the strain of *Histoplasma* being used was occurring at this time.

This phenomenon became even more pronounced in experiment VI. Of 19 animals injected with 20,000 to 99,999 organisms, 7 died spontaneously. This constitutes only 36.8 percent of the group. The length of time before death intervened was also extended; for example, spontaneous death occurred in one mouse on the 27th day and in one, on the day when it would have been sacrificed.

The distribution of the animals by initial weight in experiment VI differed widely from that of the animals receiving comparable doses in the other experiments. Unfortunately the difference is so great in the animals receiving under 20,000 organisms that no comparison can be made with regard to mortality rates among mice having the same initial weight. However, the overlap in initial weights in animals receiving 20,000 to 99,999 organisms permits such a comparison, and

Table 7. *Comparison of observed death rates among male dba line 1 mice in experiments V and VI*

Experiment V						Experiment VI					
Estimated dose per injection in thousands of organisms	Total number of animals (100 percent)	Died before 30th day after injection		Sacrificed on 30th day after injection		Estimated dose per injection in thousands of organisms	Total number of animals (100 percent)	Died before 30th day after injection		Sacrificed on 30th day after injection	
		Number	Percent	Number	Percent			Number	Percent	Number	Percent
200–299.9	5	5	100.0	------	------	200–299.9	------	------	------	------	------
100–199.9	5	5	100.0	------	------	100–199.9	------	------	------	------	------
20–99.9	10	5	50.0	5	50.0	20–99.9	[1] 19	7	36.8	12	63.2
Less than 20	------	------	------	------	------	Less than 20	10	2	20.0	8	80.0
Total	20	15	75.0	5	25.0	Total	29	9	31.0	20	69.0
Saline alone	5	------	------	5	100.0	Saline alone	5	------	------	5	100.0

[1] 1 animal died during inoculation.

there is no evidence to indicate that the high survival rates observed in experiment VI were dependent upon the comparatively low initial weights of the animals employed.

This apparent loss of virulence in the strain of the fungus employed seems to have been temporary; since, in experiment IX (table 1), a dose of approximately 43,000 organisms again killed 10 of 10 animals, or 100 percent, with none of these animals surviving beyond the 12th day after injection.

At autopsy no gross abnormalities were noted in any of the animals in experiments V and VI. Microscopically there appeared to be little or no difference in experiment V between sacrificed animals and those dying spontaneously in the percentage which showed lesions, in the type and location of the lesions, or in the number in which *Histoplasma* was demonstrated. The number of animals, however, was too small to permit statistically valid comparison. This was also true in experiment VI. But the mice that were sacrificed in experiment VI showed fewer lesions and the organism was not seen in as many mice.

When the degree of severity of the lesions is considered, the animals in experiment V appeared to follow much the same pattern as those in previous experiments. However, among the sacrificed animals the number showing no lesions was greater than in previous experiments. Since the number of animals in this series was small, this finding is probably of little importance in itself, but none of the five animals in this group showed any moderate to severe lesions. Among the animals

Table 8. *Mean weights*[1] *in grams of male dba line 1 mice injected intracerebrally with* Histoplasma capsulatum *in experiments V and VI*

Days after injection	Experiment V								Experiment VI					
	Died before 30th day after injection						Sacrificed on 30th day after injection		Died before 30th day after injection		Sacrificed on 30th day after injection			
	Estimated dose, in thousands of organisms													
	20-99.9		100-199.9		200-299.9		20-99.9		20-99.9		Less than 20		20-99.9	
	Number of mice	Mean adjusted weight	Number of mice	Mean adjusted weight	Number of mice	Mean adjusted weight	Number of mice	Mean adjusted weight	Number of mice	Mean adjusted weight	Number of mice	Mean adjusted weight	Number of mice	Mean adjusted weight
0	5	15.44	5	16.50	5	16.08	5	16.34	7	11.93	8	10.32	12	12.08
2	5	15.94	5	15.92	5	16.04	5	15.76	7	11.43	8	11.21	12	12.31
4	5	14.84	5	14.10	5	15.70	5	16.16	7	10.80	8	9.01	12	11.50
6	5	11.18	5	11.10	4	9.20	5	12.16	7	9.56	8	8.02	12	9.82
8	5	10.98	4	8.94	4	9.10	5	11.18	5	7.96	8	7.44	12	8.79
10	------	------	------	------	------	------	------	------	5	7.34	8	7.84	12	8.68
12	4	10.38	------	------	------	------	5	10.90	4	8.10	8	8.00	12	8.92

[1] Weights adjusted for differences in rate of loss associated with differences in initial weights.

in experiment VI this tendency toward a milder course of the disease was apparent in both the animals that died spontaneously and those that were sacrificed.

In experiment V there was a loss of weight following injection with *Histoplasma* which was very similar in magnitude to that observed in the other experiments, the mean decrease on the 8th day being more than 4 grams in all dose groups. It is noteworthy, however, that the decline in weight was generally delayed until after the 4th day. Many individual animals and one dose-group average showed slight gains on the 2d day.

In experiment VI, the weight loss was less both in magnitude and in rate than in any other experiment. The mean decrease on the 8th day was less than 4 grams in all dose groups, but the delay in onset was not as sharply defined as in experiment V. It should be noted that, as a group, the mice in experiment VI were the smallest used, but the tendency of small animals to lose less is offset by the weight adjustment utilized.

It is interesting to note that the pattern of the weight changes in experiment VI more closely resembles that observed in the pooled group of sacrificed animals receiving less than 20,000 organisms in the other experiments than it does that of animals which died spontaneously after any dose. The trend found in experiment V is in some ways intermediate between that in VI and that in the higher dose groups of other experiments. These observations are consistent with the hypothesis that a temporary loss of virulence was occurring during the period throughout which experiments V and VI were performed.

Histoplasma was recovered from the brain and/or spleen of each of the 235 animals except 3 in experiments I through IX. All cultures from each of these three animals were overgrown with contaminants.

Summary of Findings

1. In seven experiments, covering a period of 10 months, 235 male dba line 1 mice, 4 to 5 weeks old, were injected intracerebrally with various doses of a specified strain of *Histoplasma capsulatum*. In each of the last six experiments a group of animals was injected with saline alone to serve as controls. Altogether there were 37 control animals.

2. The results are pooled except for two experiments in which there appeared to be a temporary loss of virulence in the strain of the fungus employed.

3. Appropriate dose groupings revealed that all except 1 animal of 162 given more than 20,000 organisms (estimated by means of a plate count of the inoculum) died spontaneously before the 30th day after injection; whereas, this was true of only 13 of 24 given less than

this dose. None of the control animals died spontaneously.

4. Fifty percent of the mice injected with 20,000 or more organisms died between the 7th and 10th day following injection, the survival time increasing with decreasing dose. Fifty percent of the mice injected with less than this number of organisms survived at least until the 19th day.

5. No animal showed any gross lesions at autopsy.

6. On microscopic examination of tissues at autopsy, lesions were found in all except 3 animals that died spontaneously and in the majority (9 of 12) of those sacrificed.

7. The lesions consisted of a granulomatous meningitis in the brain, necrosis of the liver parenchyma, and a reticulo-endothelial hyperplasia of the spleen.

8. During the 8 days following intracerebral injection of *Histoplasma,* loss of weight occurred regularly. Control animals injected with saline showed a progressive gain in weight during the same period of time.

9. The rate of loss among animals which died spontaneously was similar regardless of dose, the mean weight loss being more than 4 grams in all groups.

10. The two experiments that were performed during the time over which there appeared to be a temporary loss in the virulence of the organisms are reported separately in the text.

11. *Histoplasma* was recovered from the tissues of all animals in the entire series of 235 except 3. All cultures from these three animals were overgrown with contaminants.

Discussion

Recognition of the need for a laboratory animal which could be shown to be fairly uniformly susceptible to *Histoplasma capsulatum* led to the present series of experiments. Our research indicates that such an animal has been found. It immediately follows that a base line for the measurement of the virulence of any strain of the fungus can be established.

The establishment of such a base line should make possible various studies concerning the organism which have heretofore not been possible. Among these are: (1) comparison of the virulence of one strain of *Histoplasma* with that of another; (2) comparison of the susceptibility of various strains of mice; (3) investigation of long-term, continuing or temporary changes in virulence in a given strain of the fungus which has been kept alive through a series of cultures over a period of time; (4) study of changes in the virulence in a given strain of the organism following serial passage through an animal host; and (5) possibly, comparison of the effects of various chemotherapeutic agents.

For example, with regard to possible temporary changes in virulence when the fungus has been maintained through a series of subcultures, in the series of experiments being reported there appeared to be a loss of virulence in two of the experiments which was subsequently regained in succeeding experiments. Studies should be undertaken to determine whether changes of this kind occur in all strains of *Histoplasma* and whether it is cyclical or random from the point of view of time.

Also, more intensive work should be directed toward finding, within the closest possible range of error, doses of the organism which can be expected to produce given results.

Another point for discussion is the method whereby the estimated dose was determined. All too frequently, there is reported only the dilution of the suspension which assumes implicitly that one dilution of 1–100 equals any other dilution of 1–100 with respect to the number of viable organisms. That this is not necessarily true is demonstrated by the present experiments in which it was shown that a constant dilution could give highly variable numbers of viable organisms as estimated by a plate count.

Conclusions

From the foregoing it can be concluded that male dba line 1 mice, 4–5 weeks of age, are suitable animals for laboratory study of *Histoplasma capsulatum*. Given sufficient doses, they are uniformly susceptible to the organism, and the time of survival can be regulated by the dosage.

NOTE: Since this report was received for publication, the successful inoculation of white Swiss mice (Bagg strain) by the intraperitoneal injection of very large doses of the yeast phase of *Histoplasma* suspended in mucin has been reported. (Campbell, C. C. and Saslaw, S: Use of mucin in experimental infections of mice with *Histoplasma capsulatum*. Proc. Soc. Exper. Biol. and Med. **73**: 469–472 (1950).) Our studies employing mucin, various routes of administration, and various strains of mice, and concerning the relative virulence of different strains of *Histoplasma* will be reported later.

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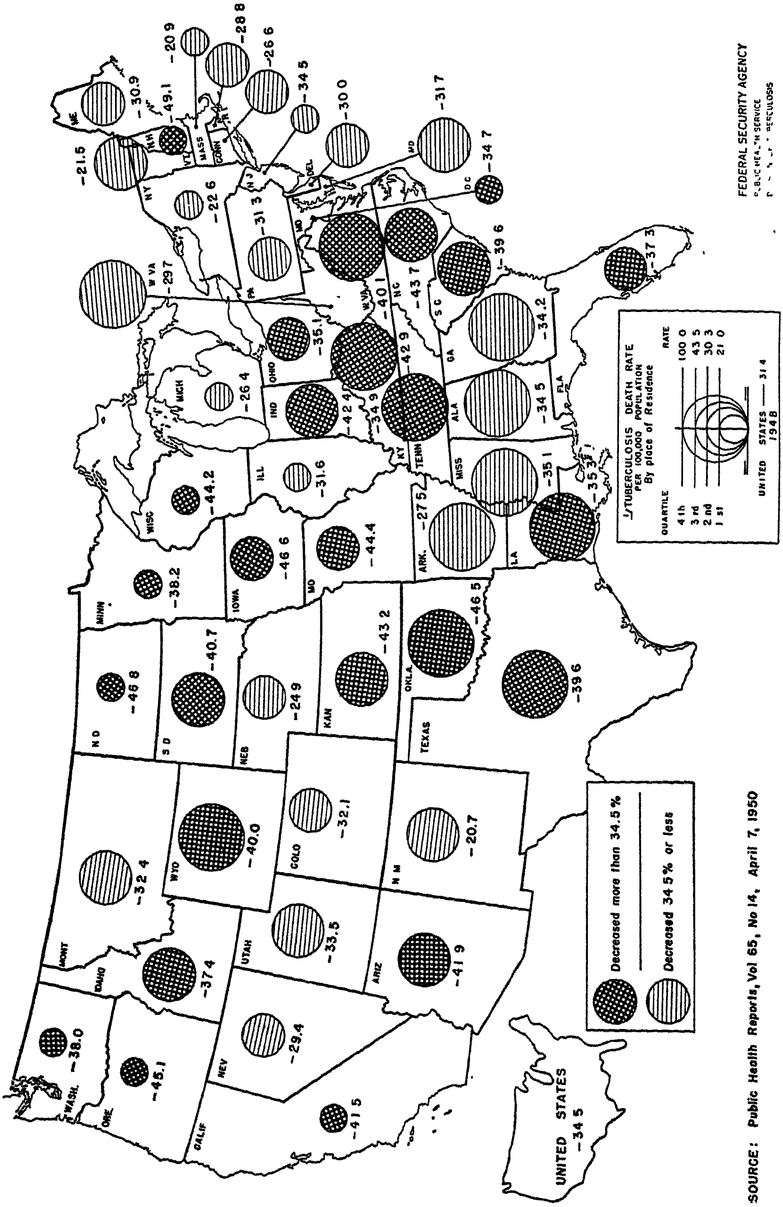

FEDERAL SECURITY AGENCY
PUBLIC HEALTH SERVICE

SOURCE: Public Health Reports, Vol 65, No 14, April 7, 1950

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MAY 13, 1950

Influenza

For the current week in the Nation, reported cases of influenza continued to decrease from the preceding week but remained above the 5-year (1945–49) median. For the current week, 2,492 cases of influenza were reported as compared with 3,399 for the previous week, 1,317 for the corresponding week a year ago, and the 5-year median of 1,221.

The cumulative total for the first 19 weeks of the year was 236,302 which may be compared with the corresponding total of 68,737 for the same period last year and 292,674 for 1947, the highest on record for the past 5 years. The corresponding 5-year median was 131,466.

Other Reportable Diseases

Reported incidence of whooping cough continued to increase for the current week over the previous week, from 2,691 to 2,867 cases. The total for the corresponding week last year was 1,054 and the 5-year (1945–49) median was 1,965. The cumulative total for the first 19 weeks of the year was 49,977 which may be compared with the corresponding total of 19,094 for the same period last year and 51,914 for 1947, the highest on record for the past 5 years. The corresponding 5-year median was 40,341.

Reported incidence of tularemia increased from 17 last week to 24 cases for the current week, the highest on record for the corresponding week in the last 5 years. For the first 19 weeks of the year the cumulative total was 387 which may be compared with 458 cases for the same period last year and 590, the highest on record for the past 5 years. Arkansas reported 10 of the 24 cases for the current week and Texas reported 4 cases.

There was an increase in reported cases of acute poliomyelitis in the Nation from 72 cases last week to 102 cases for the current week. The total for the week includes 28 cases in California (from 14 to 28) and 38 cases in Texas (from 28 to 38).

One case of anthrax was reported in Pennsylvania, 1 case of smallpox was reported in Nevada, and 74 cases of salmonellosis were reported in California.

Telegraphic case reports from State health officers for week ended May 13, 1950

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	----	----	81	14	1	8	----	----	13	----	----	----	16	----
New Hampshire	----	----	----	27	----	5	----	----	8	----	----	----	8	----
Vermont	----	----	----	11	----	----	----	----	3	----	----	----	30	----
Massachusetts	6	2	----	443	----	----	----	----	178	----	----	----	168	----
Rhode Island	----	----	----	35	----	5	----	----	----	----	----	----	63	----
Connecticut	----	----	1	265	1	42	1	----	40	----	----	2	109	----
MIDDLE ATLANTIC														
New York	----	----	[2] 1	1,731	8	281	2	----	[3] 162	----	----	2	159	23
New Jersey	2	1	2	1,667	1	72	----	----	52	----	----	----	150	----
Pennsylvania	1	1	----	777	3	73	----	----	81	----	----	5	102	----
EAST NORTH CENTRAL														
Ohio	1	----	2	399	7	61	1	----	133	----	----	----	228	9
Indiana	4	----	5	610	1	2	1	----	59	----	----	----	22	14
Illinois	----	2	2	978	5	91	----	----	46	----	----	----	59	2
Michigan	6	----	----	1,436	3	44	----	----	133	----	----	1	164	----
Wisconsin	----	----	137	765	9	9	----	----	58	----	----	----	104	----
WEST NORTH CENTRAL														
Minnesota	1	----	19	292	----	19	----	----	13	----	----	----	47	----
Iowa	----	----	----	271	1	2	4	----	4	----	----	----	12	5
Missouri	1	----	2	32	----	8	----	----	5	----	3	----	27	----
North Dakota	----	----	14	3	----	45	----	----	12	----	----	----	----	----
South Dakota	----	----	----	18	----	----	----	----	2	----	----	----	3	----
Nebraska	----	1	14	209	----	7	2	----	15	----	----	2	1	----
Kansas	1	----	----	95	----	9	----	----	18	----	----	----	32	----
SOUTH ATLANTIC														
Delaware	----	----	----	4	2	----	----	----	2	----	----	----	7	----
Maryland	----	----	11	95	4	32	----	----	10	----	----	2	57	----
District of Columbia	----	----	1	86	1	13	1	----	7	----	----	1	1	----
Virginia	----	----	273	176	1	54	1	----	12	----	----	1	111	4
West Virginia	2	----	141	635	4	22	1	----	4	----	----	----	47	11
North Carolina	4	----	----	293	2	----	2	----	5	----	1	----	65	----
South Carolina	2	----	12	86	----	8	----	----	----	----	----	1	13	7
Georgia	1	----	34	166	----	12	----	----	3	----	2	2	40	7
Florida	1	----	6	127	----	10	5	----	1	----	2	----	8	1

EAST SOUTH CENTRAL														
Kentucky	-----	-----	8	262	3	36	2	-----	10	-----	-----	2	38	13
Tennessee	9	-----	42	278	4	-----	-----	-----	16	-----	-----	-----	49	3
Alabama	2	-----	62	127	1	71	1	-----	9	-----	-----	1	46	2
Mississippi	1	2	24	66	1	45	3	-----	5	-----	1	-----	6	2
WEST SOUTH CENTRAL														
Arkansas	3	-----	191	76	1	21	-----	-----	3	-----	10	-----	24	5
Louisiana	4	-----	6	19	3	41	2	-----	2	-----	-----	3	-----	-----
Oklahoma	-----	2	71	20	-----	32	1	-----	5	-----	-----	1	27	2
Texas	16	-----	1, 088	1, 104	8	312	38	-----	31	-----	4	3	323	22
MOUNTAIN														
Montana	-----	-----	14	68	-----	1	-----	-----	25	-----	1	-----	9	-----
Idaho	-----	-----	83	111	-----	-----	2	1	3	-----	-----	-----	40	-----
Wyoming	-----	-----	-----	26	-----	3	-----	-----	1	-----	-----	-----	4	-----
Colorado	1	-----	15	164	-----	14	1	1	10	-----	-----	1	43	1
New Mexico	-----	-----	-----	35	-----	4	1	-----	5	-----	-----	-----	37	-----
Arizona	1	-----	82	71	-----	12	-----	-----	10	-----	-----	-----	21	1
Utah	1	-----	-----	351	-----	16	-----	1	5	-----	-----	-----	13	-----
Nevada	-----	-----	-----	2	-----	2	-----	-----	-----	1	-----	-----	-----	-----
PACIFIC														
Washington	1	-----	19	191	2	-----	-----	-----	37	-----	-----	2	80	-----
Oregon	1	-----	24	13	-----	26	2	4	22	-----	-----	-----	39	-----
California	2	1	5	777	3	23	28	-----	117	-----	-----	76	215	3
Total	75	12	2, 492	15, 507	80	1, 593	102	7	1, 395	1	24	108	2, 867	137
Median, 1945-49	191	9	1, 221	26, 551	75	-----	56	10	1, 968	4	12	68	1, 965	-----
Year to date, 19 weeks	2, 623	248	[4] 236. 302	176, 323	[5] 1, 782	-----	1, 688	31	32, 090	22	387	908	49, 977	2, 924
Median, 1945-49	5, 012	156	131, 466	363, 835	1, 671	-----	811	32	49, 000	118	340	928	40, 341	-----
Seasonal low week ends	(27th) July 9	-----	(30th) July 30	(35th) Sept. 3	(37th) Sept. 17	-----	(11th) Mar. 18	-----	(32d) Aug. 13	(35th) Sept. 3	-----	(11th) Mar. 18	(39th) Oct. 1	
Since seasonal low week	6, 894	-----	[4] 266, 832	195, 453	[5] 2, 695	-----	553	-----	48, 529	42	-----	398	71, 513	-----
Median, 1944-45 to 1948-49	12, 578	-----	175, 024	398, 781	2, 643	-----	261	-----	75, 650	172	-----	455	69, 349	-----

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[1] Including cases reported as salmonellosis.

[2] New York City only.

[3] Including cases reported as streptococcal sore throat.

[4] Excludes 40,200 cases estimated by county health officers to have occurred in Kentucky during the period Jan. 1 to Apr. 8, 1950, and 4,000 cases estimated to have occurred in Jones County, Iowa.

[5] Deduction: Arkansas, week ended Apr. 29, 1 case.

Anthrax: Pennsylvania, 1 case.

Alaska: Influenza 25, whooping cough 7.

Hawaii: Influenza 10, measles 1, poliomyelitis 1.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (rodent).—Under date of May 8, 1950, plague infection was reported proved in a mass inoculation of tissue from 15 rats trapped March 16 and 29, 1950, on the Island of Maui, T. H., in the Paia Gulch, which is within the endemic area of Makawao District.

DEATHS DURING WEEK ENDED MAY 13, 1950

	Week ended May 13, 1950	Corresponding week, 1949
Data for 94 large cities of the United States:		
Total deaths	9, 212	8, 973
Median for 3 prior years	9, 390	
Total deaths, first 19 weeks of year	186, 542	184, 434
Deaths under 1 year of age	587	611
Median for 3 prior years	746	
Deaths under 1 year of age, first 19 weeks of year	11, 876	12, 478
Data from industrial insurance companies:		
Policies in force	69, 811, 135	70, 402, 753
Number of death claims	14, 536	12, 656
Death claims per 1,000 policies in force, annual rate	10. 9	9. 4
Death claims per 1,000 policies, first 19 weeks of year, annual rate	10. 0	9. 7

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended April 29, 1950.—Cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis					5		1	1			7
Chickenpox			2	7	143	211	59	10	45	132	609
Diphtheria					3		1	1	1		6
Dysentery:											
Amebic						3					3
Bacillary						2	3	1			6
German measles			54		24	1, 531		69	163	280	2, 121
Influenza			1			32	3			11	47
Measles				1	557	638	51	69	41	147	1, 504
Meningitis, meningococcal				1		3					4
Mumps			114		154	576	7	53	128	359	1, 391
Poliomyelitis										1	1
Scarlet fever	1		5	1	95	33	1	6	36	7	185
Tuberculosis (all forms)	8		2	4	92	35	13	13	2	37	206
Typhoid and paratyphoid fever				1	2	1					4
Venereal diseases:											
Gonorrhea	9		11	18	70	35	22	16	32	54	267
Syphilis	5		7	6	55	12	7	3	7	13	115
Whooping cough			33		48	140	10			21	252

CUBA

Habana—Notifiable diseases—4 weeks ended March 25, 1950.—Cases and deaths of certain notifiable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox	23	1	Scarlet fever	1	
Diphtheria	21		Tuberculosis	9	
Malaria	2		Typhoid fever	11	
Measles	4				

Provinces—Notifiable diseases—4 weeks ended March 25, 1950.—Cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana[1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	3	19	13	20	3	17	75
Chickenpox		24	1	63	29	17	134
Diphtheria		28	1	1		1	31
Leprosy		3		1		2	6
Malaria	2	1	1		2	18	24
Measles		4		2	35	58	99
Poliomyelitis		1					1
Scarlet fever		1					1
Tuberculosis	4	18	9	22	16	17	86
Typhoid fever	4	14	2	13	5	19	57
Whooping cough		8		10		1	19

[1] Includes the city of Habana.

INDOCHINA (FRENCH)

Poliomyelitis.—According to information dated May 10, 1950, an outbreak of poliomyelitis has occurred in North Viet Nam (Tonkin), French Indochina. As of May 4, 304 cases had been reported, 254 of which occurred in Hanoi.

JAMAICA

Notifiable diseases—5 weeks ended April 29, 1950.—Cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	19	159	Poliomyelitis	1	
Diphtheria	2		Puerperal sepsis		1
Dysentery, unspecified		1	Scarlet fever		1
Erysipelas		1	Tuberculosis (pulmonary)	57	74
Leprosy		4	Typhoid fever	6	48
Meningitis, meningococcal	1		Typhus fever (murine)	3	1

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—The following reports include only items of unusual incidence or special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Pakistan.—During the week ended April 22, 1950, 17 cases of cholera, with 7 deaths, were reported in the port of Dacca.

Plague

China.—Reports received recently give the following figures on the reported incidence of plague in China during the year 1949: Fukien Province 376 cases, 207 deaths; Kwangtung Province 93 cases, 54 deaths; Kiangsi Province 25 cases, 11 deaths; Chekiang Province 20 cases, 14 deaths.

Ecuador.—During the period March 1–15, 1950, plague was reported in Ecuador as follows: In Loja Province, at Ciruelos, Catacocha County, one case, at Pindal, Celica County, one case; in El Oro Province, at Capiro, Pinas County, 4 cases.

Union of South Africa.—During the week ended April 29, 1950, three fatal cases of plague were reported at Reitfontein Farm, Thaba 'Nchu District, Orange Free State.

Smallpox

Indonesia—Borneo.—During the week ended April 22, 1950, 71 cases of smallpox with 18 deaths were reported in Pontianak, and 29 cases with 3 deaths were reported during the week ended April 29. During the week ended April 15, 1 case was reported in the port of Bandjermassin.

Pakistan.—Forty-seven cases of smallpox with 35 deaths were reported in Dacca during the week ended April 22, 1950.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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Hospital Construction Under the Hill-Burton Program

Analysis of the Type, Size, and Location of Projects Being Built with Federal Aid

By JOHN W. CRONIN, M. D., LOUIS S. REED, PH. D., and HELEN HOLLINGSWORTH*

It is now about 3½ years since the Hill-Burton Act providing for Federal aid to the States for the construction of hospitals and related facilities became law. An impressive volume of construction for hospital and health center projects has been approved and is under way. It is timely, therefore, to take stock of the program. What kinds of projects have been approved? What types of facilities are being built? What is the size of hospitals being constructed? Where are the facilities located? What is the distribution of projects between urban and rural communities, high and low income areas, public and nonprofit hospitals?

After the law was enacted it took the States a year or two to complete their State-wide surveys and to develop their plans for hospital and health center construction. The first State plan (Mississippi) was approved in July 1947 and the last (Nevada) in May 1949; it was not until after the State plan had been approved that the State agency could submit construction projects for approval.

There are four stages in the approval of the projects. The first stage—initial approval—involves approval of the project as consistent with the State plan and indicates that certain necessary assurances have been given. The second and third stages include assurance of the availability of the non-Federal portion of the funds, and site and soil investigation. The fourth and final stage involves final approval of the blueprints and specifications and of an acceptable bid for construction. After final Federal approval the construction contract can be let, and actual construction can begin. It takes 10 or 11 months, on the average, for the project to advance from the initial stage to final approval.

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The first project received initial approval in September 1947. By the end of 1948, 643 projects with a total estimated construction cost of $366,229,069 had received either initial or final approval. By the end of 1949, 1,019 projects with a total estimated construction cost of $668,681,949 had been initially or finally approved. On February 28, 1950, 1,145 projects—calling for a total cost of $771,086,906—had been initially or finally approved. The first project received final approval in November 1947. A total of 732 projects with construction costs amounting to $468,949,617 had received final approval by February 28, 1950, and are now completed or under construction. The Federal share of these finally approved projects is $153,291,952, slightly less than one-third because on some projects the Federal Government participates in only a part of the project. By February 28, 1950, a total of 158 projects had been completed and are now in operation.

The following analysis of approved projects is based on data for projects approved through December 31, 1949. A project may involve the construction of an entire new hospital or an addition to or remodeling of an existing hospital. Of the 1,019 projects initially or finally approved, by that date, 797, or 78.2 percent, are for the construction of general hospitals; 13.8 percent for health centers; 4.6 percent for mental hospitals; 2.6 percent for tuberculosis hospitals; and a little less than 1 percent for chronic disease hospitals. In terms of total construction costs, the distribution is somewhat different, owing largely to the fact that health centers involve relatively low expenditures per project. Of the total construction costs of all projects, the largest share, 85 percent, is for general hospitals; 6 percent is for construction of mental hospitals, 4 percent for tuberculosis hospitals, 3 percent for chronic disease hospitals, and 2 percent for health centers. The distribution of the Federal share of the cost of these projects is roughly the same (table 1).

This pattern—with major part of the money going into general

Table 1. *Distribution of projects, beds added, total construction cost and Federal share by type of facility*

[As of Dec. 31, 1949]

Type	Projects		Beds added		Construction costs			
					Total		Federal share	
	Number	Percent	Number	Percent	Amount	Percent	Amount	Percent
Total	1,019	100.0	49,645	100.0	$668,681,949	100.0	$210,339,128	100.0
General	797	78.2	40,312	81.2	569,689,714	85.2	180,084,748	85.6
Mental	47	4.6	5,393	10.9	37,758,727	5.6	13,392,713	6.4
Tuberculosis	26	2.6	2,797	5.6	29,206,646	4.4	8,657,278	4.1
Chronic	8	.8	1,143	2.3	17,580,575	2.6	3,315,442	1.6
Public health centers	141	13.8	------	------	14,446,287	2.2	4,888,947	2.3

hospitals and only small fractions into the other types of facilities—has held quite constant since the beginning of the program, and thus far shows no sign of change. Among the States, however, wide variations appear in the emphasis given to the different types of facilities.

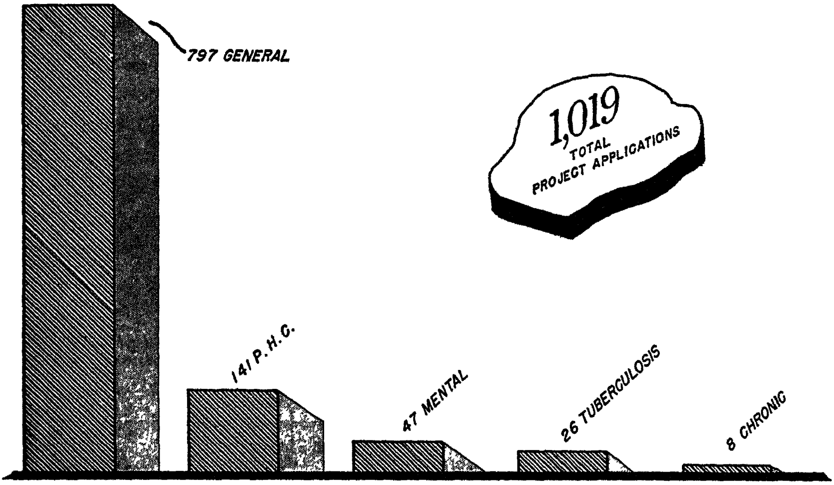

Figure 1. Approved hospital construction project applications, by type of facility, as of December 31, 1949.

Thus far, 19 States have approved only general hospital projects. On the other hand, Puerto Rico has used 43.8 percent of its Federal hospital construction funds to build a tuberculosis hospital, and Louisiana has used 29 percent of its Federal money under the Hill-Burton Act for mental hospitals. South Carolina leads the other States in con-

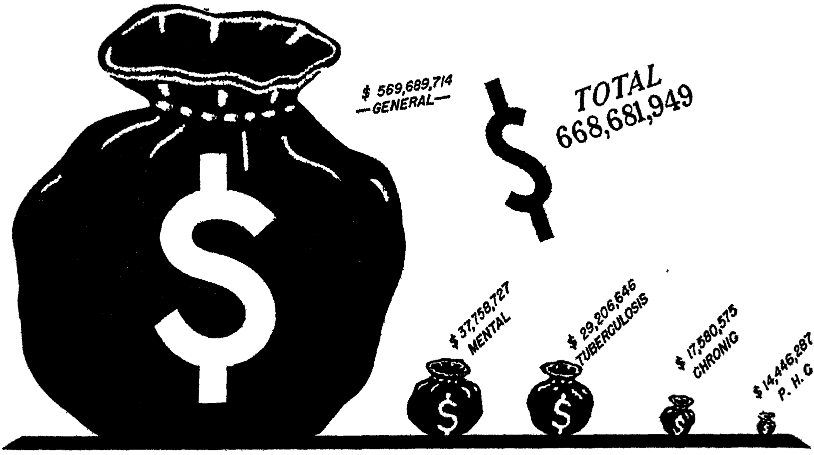

Figure 2. Estimated construction cost of approved projects, by type of facility, as of December 31, 1949.

struction of health centers; thus far, it has used 8.7 percent of its Federal funds for these facilities.

What is the size of general hospitals being constructed under the program, and in what types of communities are they located? Of the 797 general hospital projects thus far approved for construction, 405, or 50.8 percent, are for completely new hospitals; the remaining projects are for replacement of a hospital building or for additions or alterations to existing hospitals (table 2). Most of the new hospitals being built are small—68 percent of them will have less than 50 beds, and 89 percent will have less than 100 beds. Contrariwise, most of the hospitals to which additions or alterations are being made are medium-sized or large hospitals; only 45 percent of these hospitals will have less than 100 beds after the project is completed, and 13 percent of the hospitals will have more than 300 beds when completed.

Table 2. *Distribution of new hospital projects, of projects involving additions or alterations to existing hospitals, and of all projects according to size of hospital after completion of the project*

[As of Dec. 31, 1949]

Size of hospitals	Projects for construction of new hospitals		Projects for construction of additions or alterations to existing hospitals*		All projects	
	Number	Percent	Number	Percent	Number	Percent
Total	405	100.0	392	100.0	797	100.0
Under 25	111	27.4	14	3.6	125	15.7
25–49	166	41.0	48	12.2	214	26.9
50–74	68	16.8	73	18.6	141	17.7
75–99	17	4.2	40	10.2	57	7.1
100–299	40	9.9	165	42.1	205	25.7
300 and over	3	.7	51	13.0	54	6.8
Unknown			1	.3	1	.1

*Includes projects for the replacement of an existing hospital.

For the two types of projects combined, 43 percent of all general hospital projects involve hospitals which when completed will have less than 50 beds; 25 percent of the projects involve hospitals of 50 to 100 beds; and 32 percent involve hospitals of over 100 beds.

In general, the hospitals being built under the program are smaller than those in the country's present general hospital plant. Of all general and special short-term hospitals, 32 percent have less than 50 beds; 26 percent have 50 to 100 beds; and 42 percent have 100 beds or more.[1]

Although a majority of the hospitals being built under the program are small, i. e., under 100 beds, the larger share of Federal funds is being used for the construction of medium or large-sized hospitals (table 3). This difference is due, of course, to the fact that one hospital of 100 beds costs more than four times as much as a hospital of 25 beds. In the distribution of Federal funds for the construction of completely new hospitals, 37 percent is used for hospitals of less than 50 beds; 29 percent is for hospitals of 50 to 100 beds, and another 34 percent is for hospitals of more than 100 beds. In projects involving replacement of, or additions and extensions to existing hospitals, only 24.4 percent of the Federal funds is for projects which will have less than 100 beds upon completion and 19.0 percent is for projects which will have more than 300 beds. For both types of projects combined, 19.9 percent of the Federal funds is going into projects—mostly new—which will have less than 50 beds when completed; 22.5 percent is being used to build hospitals of 50 to 100 beds, 45.5 percent to build hospitals of 100 to 300 beds, and 12.1 percent to build hospitals of over 300 beds.

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[1] American Hospital Association: Statistics and Directory Section. Hospitals. June 1949, pt. 2, p. 22.

Table 3. *Distribution of Federal share of projects for construction of new hospitals, of projects involving additions or alterations to existing hospitals, and of all projects, according to size of hospital after completion of the project*

[As of Dec. 31, 1949]

Size of hospitals	Projects for construction of new hospitals		Projects for construction of additions or alterations to existing hospitals*		All projects	
	Amount	Percent	Amount	Percent	Amount	Percent
Total	$78, 564, 151	100. 0	$101, 520, 597	100. 0	$180, 084, 748	100. 0
Under 25	7, 762, 124	9. 9	864, 968	. 9	8, 627, 092	4. 8
25–49	21, 257, 149	27. 1	5, 937, 700	5. 8	27, 194, 849	15. 1
50–74	16, 614, 331	21. 1	10, 913, 780	10. 8	27, 528, 111	15. 3
75–99	6, 006, 311	7. 6	7, 049, 851	6. 9	13, 056, 162	7. 2
100–299	24, 487, 361	31. 2	57, 448, 977	56. 6	81, 936, 338	45. 5
300 and over	2, 436, 875	3. 1	18, 836, 767	18. 5	21, 273, 642	11. 8
Unknown**	----------	----------	468, 554	. 5	468, 554	. 3

*Includes projects for the replacement of an existing hospital.

**Involves one project for the construction of one of several buildings comprising a medical center; total number of beds in the entire center is undetermined, pending receipt of projects for the remaining buildings.

It is of interest to compare this pattern with the distribution of the capital value of the general hospital plant of the country according to size of hospital. Of the total assets of all general and special short-term hospitals, 14.6 percent represents the assets of hospitals with less than 100 beds, 34.6 percent the assets of hospitals with 100 to 259 beds, and 50.8 percent the assets of hospitals with more than 250 beds.[2] It would appear that the Hill-Burton program is being used to build or help build predominantly small or medium-sized hospitals, thus increasing the number and proportion of small hospitals and placing proportionately less emphasis on the construction of big hospitals.

There are, as may be expected, marked regional differences in the size and type of general hospital projects being built with Federal aid. In the New England and Middle Atlantic States, for example, which are already relatively well supplied with hospitals, very few of the projects are for construction of new hospitals—almost all are for replacement of existing buildings or for additions to existing hospitals. In the South, on the other hand, 71 percent of the projects are for new hospitals.

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[2] See footnote 1.

Where are projects being built? Of the completely new hospitals being built under the program, the majority are in small towns and small cities: 71.3 percent of the projects are in places of less than 5,000 population, and only 12.1 percent are in towns or cities of more than 10,000 population. Of the projects to replace, extend, or alter existing hospitals, relatively more, as would be expected, are in larger population centers. Of these projects, only 26.3 percent are in places of less than 5,000 population, and 22.7 percent are in cities of more than 50,000 population.

The smaller projects, of course, tend to be in the smaller population centers. Hence, the distribution of the Federal funds according to size of community is somewhat different from the distribution of projects. When figures for new hospitals and for replacement of, or additions or alterations to existing hospitals are combined, it appears that 27.0 percent of the Federal funds will be used to build or extend hospitals in places of less than 5,000 population—hospitals that will serve predominantly rural people (table 4). A total of 17.9 percent of the Federal funds is for projects in localities of 5,000 to 10,000 population, 31.5 percent for projects in localities of 10,000 to 50,000 population, and 23.6 percent for projects in cities of over 50,000 population. In other words, almost one-third of the Federal funds is for projects in small towns serving predominantly rural people; one-fifth of the funds goes into large cities; while the remainder is for projects in small and medium-sized cities—projects which will serve both urban and rural population.

How does the distribution of the hospital projects according to size of community compare with the present distribution of our

Table 4. *Distribution of general hospital projects and of Federal share according to size of community*

[As of Dec. 31, 1949]

Size of community	Number of projects		Federal share	
	Number	Percent	Amount	Percent
Total	797	100.0	$180,084,748	100.0
Under 2,500	234	29.4	23,745,346	13.2
2,500–4,999	158	19.8	24,890,532	13.8
5,000–9,999	132	16.6	32,277,215	17.9
10,000–24,999	124	15.6	41,172,742	22.9
25,000–49,999	45	5.6	15,520,338	8.6
50,000 and over	104	13.0	42,478,575	23.6

hospital plant? Of our existing general (non-Federal) hospitals, 29.4 percent are in places of less than 5,000 population, 14.5 percent are in places of 5,000 to 10,000; 19.5 percent are in places of 10,000 to 50,000; and 36.6 percent are in cities of over 50,000.

Compared with our present distribution of hospitals, the program is tending to place hospitals in the smaller population centers, where they will serve predominantly rural people. This is precisely the purpose for which the program is designed, for the law specifies that the program shall build hospitals where they are most needed, with special emphasis given to rural places and places of low per capita income.

The projects for construction of new small hospitals are largely in small communities. None or almost none of the new small hospitals of 50 beds or less are being built in large centers. For example, of new hospitals of less than 50 beds, 63 percent are in communities of less than 2,500 population and 89 percent are in communities of less than 5,000. Large cities have little room or need for new small hospitals.

The State plans divide the State into hospital-service areas of three types. Base areas are those containing a teaching hospital or a medical school, or alternatively a city with a population of at least 100,000; and one or more hospitals, each containing over 200 beds and furnishing internships and residencies in two or more specialties. Intermediate areas are areas with a population of more than 25,000, containing at least one general hospital of more than 100 beds. Rural areas are all others. Of the total general hospital projects approved by December 31, 1949, 55.8 percent are in "rural" areas, 32.8 percent are in "intermediate" areas, and 11.4 percent in "base" areas. Of the 1,548 rural areas in the country as a whole, 26.1 percent have projects thus far, as compared with 31.4 percent of the intermediate areas and 44.9 percent of the 107 base areas. Approved projects will provide 28.5 percent of the additional beds

Table 5. *Types of general hospital service areas, number and percent with approved project applications, additional beds needed, and beds to be provided by approved projects*

[As of Dec. 31, 1949]

Types of area	Areas			Beds		
	Total	With project applications		Total additional beds needed in all areas	Included in project applications	
		Number	Percent of areas		Number	Percent of beds needed
Total	2,327	663	28.5	244,801	39,321	16.1
Base	107	48	44.9	88,527	6,357	7.2
Intermediate	672	211	31.4	101,106	17,245	17.1
Rural	1,548	404	26.1	55,168	15,719	28.5

needed in rural areas and 17.1 percent and 7.2 percent of the additional beds needed in intermediate and base areas, respectively (table 5). In short, in accordance with the intent of the Federal law, the program has been of considerably more help in meeting the needs of rural than of urban areas.

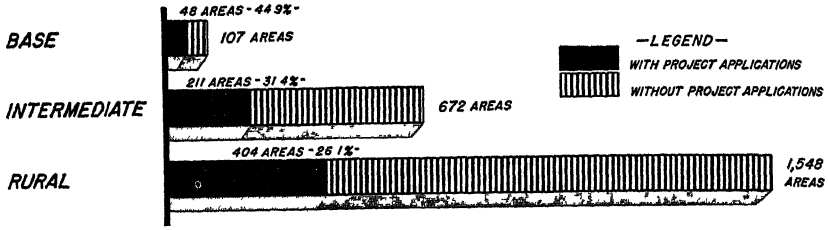


Figure 3. Type of areas and number with general hospital projects, as of December 31, 1949.

The fact that under the program substantial numbers of small hospitals are being built—even though the proportion of the Federal funds going into these hospitals is quite small in relation to the total—deserves consideration in view of the inherent limitations of small hospitals. Have these hospitals the potentiality of growing into more effective-sized institutions later? An analysis of the bed needs of the areas in which these small hospitals are located indicates that, in general, this is the case. On the average these new hospitals of less than 50 beds will supply only about half the total number of beds estimated by the States to be needed in their areas.

What is the economic status of communities receiving Federal funds for general hospital projects? Are the relatively low or the relatively high income areas receiving the most benefit from the program? In

Table 6. *Index of per capita income of general hospital service areas, number and percent with project applications, additional beds needed and beds to be provided by approved projects*

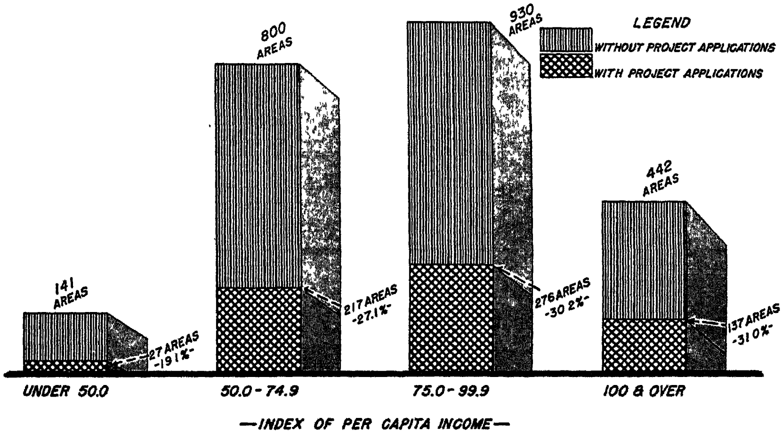
[As of Dec. 31, 1949]

Index of per capita income*	Areas			Beds		
	Total**	With project applications		Total additional beds needed in all areas	Included in project applications	
		Number	Percent of areas		Number	Percent of beds needed
Total	2,296	657	28.6	239,478	38,752	16.2
Under 50.0	141	27	19.1	6,571	879	13.4
50.0–74.9	800	217	27.1	39,952	10,390	26.0
75.0–99.9	913	276	30.2	70,019	14,563	20.8
100 and over	442	137	31.0	122,936	12,920	10.5

*Index of per capita income means relationship of the per capita income of area to the State average.

**Excludes Alaska, Hawaii, Puerto Rico, and the Virgin Islands, for which per capita income data are not available.

the country as a whole, as shown in the State plans, there are 141 areas in which the per capita income is less than 50 percent of the per capita income of the State in which these areas are located (table 6). Among these very poor areas, 19.1 percent have thus far submitted approved projects for general hospitals, and these projects will provide 13.4 percent of the additional beds estimated to be needed in these areas. There are 800 areas with a per capita income of between 50 and 75 percent of the State average; 27.1 percent of these areas have projects, and these projects will meet 26.0 percent of the bed deficit of these areas. Of the 913 areas with per capita incomes of between 75 and 100 percent of the State average, 30.2 percent have submitted approved projects, and these projects will provide 20.8 percent of the additional beds needed in these areas. There are 442 areas with per capita incomes of over 100 percent of the State per capita income; in general, these are the large cities of the State. Among these wealthy areas, 31.0 percent have projects, but these projects will provide only 10.5 percent of the additional beds needed in these areas.



*Relationship of Area Per Capita Income to that of State.

Figure 4. Areas by index of per capita income* and number with general hospital projects, as of December 31, 1949.

In short, the vast majority of the approved projects are in areas of less than average income; the projects approved thus far will meet far more of the bed needs in the areas of relatively low than in areas of relatively high income. The program, however, is not developing facilities in the very poorest areas—those with per capita incomes of less than 50 percent of the State average—to as great degree as in areas which are better off economically but still below the average. Inquiry reveals that the major reason for this difference is the fact that these poor areas lack the funds to build or maintain a hospital.

The recent amendments to the program,[3] which will permit States to use Federal funds for a larger share of the costs of hospitals, may help some of these poorer areas. The major problem, however, probably is maintenance; until these areas receive aid in maintaining a hospital or until their residents have some prepayment plan for hospitalization, it is unlikely that these very poor areas will have a hospital.

Who owns the facilities being built under the program? Are they mainly public or mainly nonprofit institutions? Virtually all the mental, tuberculosis, and chronic disease hospital projects, and, of course, all the health center projects are for publicly owned facilities. Together, however, these projects, as already noted, account for only 14 percent of the total Federal share of all approved projects. Approved projects for general hospitals are almost equally divided between nonprofit and public hospitals. A total of 56.4 percent of the projects are for public hospitals.[4] However, the public hospitals being constructed under the program—these hospitals will be mainly owned by county governments—are of smaller size than the nonprofit projects, so that actually 53.7 percent of the Federal funds is going into nonprofit hospitals and only 46.3 percent into publicly owned hospitals. (Incidently the publicly owned hospitals being constructed under the program are community hospitals in the same sense as are the voluntary ones, i. e., they will serve the whole community, and are not intended merely or mainly for charity patients.)

Table 7. *Percent distribution of general hospital projects and of Federal share of construction costs according to nonprofit or public sponsorship*

[As of March 1948]

Region*	Projects			Federal share		
	All	Nonprofit	Public	All	Nonprofit	Public
Region I	100.0	96.8	3.2	100.0	95.0	5.0
Region II	100.0	82.8	17.2	100.0	96.0	4.0
Region III	100.0	65.0	35.0	100.0	59.6	40.4
Region IV	100.0	55.8	44.2	100.0	70.5	29.5
Region V	100.0	37.7	62.3	100.0	45.4	54.6
Region VI	100.0	23.8	76.2	100.0	31.7	68.3
Region VII	100.0	40.8	59.2	100.0	50.7	49.3
Region VIII	100.0	29.6	70.4	100.0	33.5	66.5
Region IX	100.0	32.0	68.0	100.0	35.7	64.3
Region X	100.0	20.0	80.0	100.0	15.1	84.9
Total	100.0	43.6	56.4	100.0	53.7	46.3

*Region I: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont. Region II: Delaware, New Jersey, New York, Pennsylvania. Region III: District of Columbia, Maryland, North Carolina, Virginia, West Virginia. Region IV: Kentucky, Michigan, Ohio. Region V: Illinois, Indiana, Minnesota, Wisconsin. Region VI: Alabama, Florida, Georgia, Mississippi, Tennessee, South Carolina, Puerto Rico, Virgin Islands. Region VII: Iowa, Kansas, Missouri, Nebraska, North Dakota, South Dakota. Region VIII: Arkansas, Louisiana, New Mexico, Oklahoma, Texas. Region IX: Colorado, Idaho, Montana, Utah, Wyoming. Region X: Alaska, Arizona, California, Nevada, Oregon, Washington, Hawaii.

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[3] Public Law 380. 81st Cong., 1st sess.

[4] Data are for March 1948. Earlier tabulations showed the same distribution between public and privately owned facilities and indications are that the proportions have not changed.

Among the regions of the country there is wide variation in type of ownership of the approved projects. In New England, 96.8 percent of the approved projects are for nonprofit facilities, and in the Middle Atlantic States (New York, New Jersey, Delaware, Pennsylvania) 82.8 percent. On the other hand, in the South (region VI) and the far West (region X) only 23.8 and 20.0 percent, respectively, of the projects are for nonprofit hospitals (table 7).

Summary

Of the projects approved for construction with Federal aid under the Hill-Burton hospital construction program, 78 percent are for the construction of general hospitals, 5 percent for mental hospitals, 3 percent for tuberculosis hospitals, less than 1 percent for chronic disease hospitals, and 14 percent for public health centers. Of the total construction cost of all projects, 85 percent is for the construction of general hospitals, 6 percent for mental hospitals, 4 percent for tuberculosis hospitals, 3 percent for chronic disease hospitals, and 2 percent for health centers.

Slightly more than 50 percent of the general hospital projects are for the construction of completely new hospitals, the remainder being for the construction of facilities to replace existing buildings or for additions or alterations to existing hospitals. The vast majority of the completely new hospitals being built are small—68 percent will have less than 50 beds. Contrariwise, the majority of hospitals to which additions or alterations are being made, or which will replace existing buildings, are medium-sized or large hospitals—100 beds or over. Almost 50 percent of all the general hospital projects under the program are being built in communities of less than 5,000 population and will serve predominantly rural areas.

Thus far the program is largely meeting its objective of building hospitals where they are most needed and especially in low income and rural areas.

The general hospital projects are about evenly divided between those sponsored by public agencies and those sponsored by nonprofit groups. The relative proportion of the two types, however, varies widely from region to region.

Immunization of European Displaced Persons

By Ralph Gregg, M. D.*

Of the millions of displaced persons left in the care of UNRRA in Germany, Austria, and Italy following World War II, approximately 205,000 are destined to immigrate to the United States under present legislation. This number may be increased to between 300,000 and 400,000 by legislation now under consideration. It is, therefore, of interest from a public health standpoint to learn what attempts have been made to immunize these displaced persons against epidemic diseases.

International Refugee Organization

The agency that has assumed primary responsibility for support and care of the displaced persons in Europe is the International Refugee Organization. It operates camps in the American Zones of Austria and Germany. In the British and French Zones national organizations operate the camps and collaborate with the International Refugee Organization which not only gives shelter, food, and clothing but also provides medical care.

By the autumn of 1949 the number of displaced persons in Europe had declined to about 600,000, about half of whom were living in camps. The others were living in communities or were employed on farms; they were the so-called "out-of-camp refugees."

Displaced persons emigrating to the United States are called forward from camps and from the outside to resettlement centers in Germany, Austria, and Italy where they remain for a short period. After receiving their visas from the consular officials at the resettlement centers, they go to the embarkation center for final check and clearance by the immigration officials before sailing.

IRO Medical Program

The Medical Division of the International Refugee Organization with headquarters at Geneva operates medical facilities in the refugee camps, the resettlement centers, and the Camp Grohn Embarkation Center near Bremerhaven. The IRO also operates hospitals outside the camps for persons requiring prolonged or specialized care.

The IRO medical program provides physical examinations of all displaced persons including those going through the resettlement centers previous to emigration to the United States and other countries. The examination at the resettlement center is thorough. It includes the services of specialists in tuberculosis, pediatrics, and internal medicine; routine chest X-rays; laboratory tests; and dental examination. The laboratory tests include the usual clinical blood examination, blood serology, and urinalysis. The IRO medical examination reports are made available to the Public Health Service physicians at the resettlement centers for use in their visa medical examinations.

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Immunization Against Communicable Diseases

The IRO Medical Division recognized from the beginning the importance of guarding against outbreaks of contagion among persons living in crowded camps; hence, preventive health work has been an important part of the medical program. In accordance with accepted public health standards, it has been the policy to immunize the displaced persons against smallpox, typhoid and paratyphoid fevers, diphtheria, and whooping cough. In some areas, typhus immunization is still practiced although this is not general throughout IRO. In all areas, however, DDT dusting is carried out at intervals and always prior to the movement of the displaced persons to a new location.

The greatest difficulty in the immunization work has been with the out-of-camp people. Many of them do not live near a camp and are unable to go to one for inoculation. The first opportunity to immunize many persons in this group occurs when they present themselves to the resettlement centers in preparation for entry into the United States and other countries such as Canada, Brazil, and Australia. Every effort is made to immunize the out-of-camp refugees as they pass through the resettlement centers and the embarkation center. However, their stay at either center is usually too brief to complete any course of immunization. A high percentage of the in-camp people, on the other hand, are completely immunized while in the local camps.

The IRO attempts to meet the quarantine requirements of the countries which the displaced persons will enter. The International Certificate of Vaccination is completed for smallpox vaccination, including a record of the result. Some persons, however, are not vaccinated, or the recording is incomplete, owing to circumstances at the time of the medical examination at the resettlement center. Other immunizations are not always recorded on the International Certificate, and a complete record for the emigrant may, therefore, not be available when he arrives at the resettlement center and the embarkation center. The displaced persons come to the United States on military transports now operated by the U. S. Navy. Transportation is provided by the IRO by contract with the United States. Before embarkation all persons are required to present valid certificates of smallpox vaccination to comply with quarantine regulations of the United States. During the voyage the ship's medical officers attempt to complete diphtheria immunizations of all children. Also, because of the frequent occurrence of measles during the voyage, immune gamma globulin is provided for nonimmune children under 6 years of age.

A table shows the percentages of displaced persons immunized in the main IRO areas. As up-to-date figures are not available, the population used as a basis for the percentages is the approximately 600,000 displaced persons who were in Europe last autumn. Those persons not yet immunized for smallpox at the time of embarkation are then vaccinated to comply with quarantine requirements so that practically 100 percent are finally vaccinated.

Percentages of population immunized in the main IRO areas

Area	Diphtheria [1]	Smallpox	Typhoid and Paratyphoid	Typhus	Whooping cough [2]
Austria	85.4	92.7	97.2	39.8	51.3
Germany:					
British Zone	65.6	72.8	82.2	75.3	------------
French Zone	47.2	74.76	97.63	2.69	------------
United States Zone	77.6	92.7	93.0	92.8	19.7
Italy	39.0	82.0	72.0	53.0	15.0

[1] For age group 1-16.
[2] For age group 1-8.

All age groups received smallpox, typhoid and paratyphoid, and typhus vaccines. Diphtheria toxoid was given to children from 1 to 16 years of age, and whooping cough vaccine to children from 1 to 8 years. The latter was not administered in the British or French Zones of Germany and was used to a very limited extent in the United States Zone and Italy. In Austria 51.3 percent were immunized.

Conclusion

Since the end of World War II, aid has been extended to millions of displaced persons in Europe by the International Refugee Organization. Refugee camps are operated in Germany, Austria, and Italy. In addition to caring for the displaced persons, the IRO has assisted in their resettlement either through repatriation or emigration to other countries. An essential part of the assistance program has been the medical care provided by the Medical Division, which since the beginning of its activities has promoted immunizations against epidemic diseases. Within the limitations of the existing conditions, immunizations have been provided to displaced persons both in the camps and out of the camps. For persons emigrating to the United States and to other countries, efforts to complete the immunizations have extended through the various steps of the procedures up to the time of embarkation. Diphtheria and measles immunizations have also been given on board ship.

Although figures are not available for the numbers of immunizations given, estimates by the Medical Division of IRO indicate that, except for whooping cough, very high percentages have been achieved in all IRO areas. It appears that practically 100 percent of the displaced persons are vaccinated against smallpox and somewhat lower percentages against typhoid fever, typhus, and diphtheria. Probably no other civilian population group in the world has been so completely immunized against these diseases.

Reported Incidence of Communicable Diseases in the United States, First Quarter, 1950

This summary gives provisional figures on cases of communicable diseases reported by the health departments of each State, Alaska, Hawaii, Panama Canal Zone, Puerto Rico, and the Virgin Islands for the first 3 months of 1950. The figures are subject to change when final annual figures are released by each State, but in most instances the changes will be small.

Usefulness of these data is limited greatly by wide variations in completeness and accuracy of reporting within and between States and for different diseases. Unconfirmed diagnoses, differing definitions of diseases for reporting purposes, and varying methods of tabulation also contribute to the difficulties of interpretation.

The table gives the numbers of reported cases of selected communicable diseases for each division and State in January, February, and March 1950. Data for diseases reported with low frequencies or by only a few States are given after the table.

Influenza and pneumonia

Reported cases of influenza for the quarter totaled 98,127 as compared with 27,169 cases reported for the corresponding period in 1949. The 5-year (1945–49) median was 128,825. Although this increase over the first quarter for 1949 is substantial, during the 10-year period, 1940–49, 6 of the 10 first quarter periods were higher than the same period in 1950. The highest corresponding number of cases reported was 402,574 in the first quarter of 1944.

Reported cases of pneumonia increased slightly, from 33,118 for the first quarter of 1949 to 33,635 for the corresponding period of 1950. The 5-year (1945–49) median was 33,719.

Poliomyelitis

For the quarter, 1,209 cases of acute poliomyelitis were reported compared with 985 cases for the corresponding period of 1949. The relatively high incidence for the quarter is related to the very high incidence of last year and represents the declining phase of that epidemic. (Cases of acute poliomyelitis reported by month for the United States were as follows: January, 469; February, 391; and March, 349.)

Comparison of the reported cases of acute poliomyelitis by type for the first quarter of 1950 with the corresponding period of 1949 shows an increase in the number of unspecified type. The type unspecified increased from 38.7 percent of the total for the first quarter of 1949 to 53.4 percent for the corresponding period of 1950. The nonparalytic type increased from 7.0 to 7.2 percent, and the cases specified as paralytic decreased from 54.3 to 39.4 percent of the total.

Infectious encephalitis

The reported incidence of infectious encephalitis increased considerably over the previous corresponding quarter and was higher than any quarter in the 10-year period, 1940–49. The number reported for the first quarter of 1950 was 165 compared with 101 cases for the previous corresponding period.

Other diseases

The reported cases of diphtheria, malaria, scarlet fever, smallpox, trachoma, and typhus fever (endemic) for the quarter were not only lower than the 5-year median but were the lowest recorded for the 10-year period, 1940–49.

Reported cases of Selected Communicable Diseases in the United States, Each Division and State, First Quarter 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Brucellosis (044)	Chickenpox (087)	Conjunctivitis[1] (370)	Diphtheria (055)	Dysentery (045-048) Amebic (046)	Dysentery (045-048) Bacillary (045)	Dysentery (045-048) Unspecified (047, 048)
New England	19	12,963	16	62	2	38	
Maine	3	1,205		1			
New Hampshire		657		2			
Vermont		1,568					
Massachusetts	5	6,558		52		37	
Rhode Island		564		4		1	
Connecticut	11	2,411	16	3	2		
Middle Atlantic	66	29,682	4	164	235	100	
New York	42	9,831	4	82	221	86	
New Jersey	7	8,730		16	10	2	
Pennsylvania	17	11,121		66	4	12	
East North Central	188	28,598	254	236	223	74	1
Ohio	9	5,946		110	7	2	1
Indiana	3	987	13	66	3	4	
Illinois	110	5,486	40	25	138	32	
Michigan	34	5,728	201	27	74	36	
Wisconsin	32	10,453		8	1		
West North Central	199	7,711	89	106	9	6	5
Minnesota	58	747	2	26	3	6	1
Iowa	40	597	5	6			
Missouri	29	993	14	28	1		4
North Dakota	4	310	2	4	2		
South Dakota	21	260	3	12			
Nebraska	6	1,764	7	15	3		
Kansas	41	3,040	56	15			
South Atlantic	52	6,240	85	439	83	55	961
Delaware		106		3			1
Maryland	11	1,720		61	3	3	
District of Columbia		233		2	2	1	
Virginia	13	1,329		68	2		952
West Virginia	2	913	55	60		3	
North Carolina	2			102	54	7	
South Carolina	2			56		1	
Georgia	15	1,086	16	60	7	30	8
Florida	7	853	14	27	15	10	
East South Central	37	2,132	19	305	61	18	3
Kentucky	4	498	19	63	15	2	
Tennessee	8	714		83	19	9	3
Alabama	12	920		81	7	(*)	(*)
Mississippi	13			78	20	7	
West South Central	129	2,802		406	297	3,998	2,946
Arkansas	7	1,021		42	41	5	44
Louisiana	6	122		43	75		
Oklahoma	26	1,659		46	10		10
Texas	90			275	171	3,993	2,892
Mountain	28	6,727	86	78	52	206	15
Montana	2	989	9	8			
Idaho	4	663	32	14			
Wyoming		107	6	2			
Colorado	17	1,330		14		4	
New Mexico	1	445	8	12	4	10	3
Arizona	2	1,384		19	41	191	7
Utah	2	1,670		6	7	1	4
Nevada		49	31	3			1
Pacific	86	15,688	157	141	114	144	41
Washington	20	2,085	98	6	9	8	31
Oregon	32		59	16	8	2	10
California	34	13,603		119	97	134	(*)
First quarter 1950	804	112,543	710	1,937	1,076	4,639	3,972
First quarter 1949	953	193,168	712	2,191	1,151	4,351	3,741
Median 1945-49	1,111	138,372	578	3,655	802	4,351	2,818
Alaska		280		1			
Hawaii	1	672		4	2	61	
Panama Canal Zone[2]		43		5	10	13	
Puerto Rico[3]		337		72			6
Virgin Islands		16					

* Reported not notifiable.

[1] For reported cases of "Ophthalmia neonatorum" see the section following table.

[2] Two months only. [3] From weekly reports.

Reported Cases of Selected Communicable Diseases in the United States, Each Division and State, First Quarter 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Septic sore throat (051)	Smallpox (084)	Tetanus (061)	Trachoma (095)	Trichiniasis (128)
New England		2,357	185		1		10
Maine		136	16				4
New Hampshire		98					
Vermont		64	46				
Massachusetts		1,578	36				2
Rhode Island		159	6		1		
Connecticut		322	81				4
Middle Atlantic	1	3,971	32		10		41
New York		[1] 1,891	(1)		8	(*)	31
New Jersey	1	619	32		2		2
Pennsylvania		1,461					8
East North Central	1	7,935	497	1	7	2	13
Ohio	1	3,262	18		2	1	5
Indiana		728			1		
Illinois		922	27		2	1	
Michigan		1,892	285		2		8
Wisconsin		1,131	167	1			
West North Central	1	1,508	79	4	2	93	
Minnesota		345	62				
Iowa		160	1				
Missouri		252	9			85	
North Dakota		41	2			6	
South Dakota		72	2	2		1	
Nebraska		228		1			
Kansas	1	410	3	1	2	1	
South Atlantic	5	1,932	912		11		2
Delaware		69					
Maryland	1	379	18		1		1
District of Columbia		61					1
Virginia		336	738		2		
West Virginia	1	284	82		1		
North Carolina		529	25				
South Carolina	1	28	5		1		
Georgia	2	183	28		4		
Florida		63	16		2		(*)
East South Central	1	1,153	90	3	21	7	
Kentucky		420	43	3	1	7	
Tennessee		439	47		5		
Alabama	1	190	(*)		9		(*)
Mississippi		104	(*)		6		(*)
West South Central	2	801	2,193	2	13	59	1
Arkansas	1	69	533		4	30	
Louisiana		41	2		9		1
Oklahoma	1	192	95	1		18	
Texas		499	1,563	1		11	
Mountain	3	828	1,119	2	1	68	3
Montana		185	55				
Idaho		101	257				2
Wyoming		35	2				
Colorado		166	46	1			1
New Mexico		86	1		1	1	
Arizona		201	729	1		67	
Utah		52	1				
Nevada	3	2	28				
Pacific		2,712	431	1	11	5	5
Washington		698	47				
Oregon		254	129	1	1		
California		1,760	255		10	5	5
First quarter 1950	14	23,197	5,538	13	77	234	75
First quarter 1949	22	36,609	6,917	18	74	292	111
Median 1945–49	6	36,609	4,121	71	74	428	111
Alaska		2	37				
Hawaii		6	3		4		
Panama Canal Zone [2]		1					
Puerto Rico [3]					42		
Virgin Islands							12

*Reported not notifiable.

[1] Cases reported as septic sore throat included with scarlet fever.

[2] Two months only. [3] From weekly reports.

Reported Cases of Selected Communicable Diseases in the United States, Each Division and State, First Quarter 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Tuberculosis		Tularemia (059)	Typhoid fever (040)	Paratyphoid fever [1] (041)	Typhus fever, endemic (101)	Whooping cough (056)
	All forms (001-019)	Respiratory (001-008)					
New England	1,381	1,280		12	19		4,333
Maine	102	87		3	1		338
New Hampshire	24						89
Vermont	24	21					351
Massachusetts	749	705		4	17		1,790
Rhode Island	140	138		1			313
Connecticut	342	326		4	1		1,452
Middle Atlantic	5,250	3,170	1	75	42	2	7,410
New York	3,416	3,170		13	23	1	2,722
New Jersey	733			39	4		2,102
Pennsylvania	1,101		1	23	15	1	2,586
East North Central	3,915	2,263	43	56	27		9,042
Ohio			2	20	1		2,524
Indiana	604	566	4	11	2		408
Illinois	1,804	1,697	31	14			1,082
Michigan	1,147		5	6	22		3,096
Wisconsin	360		1	5	2		1,932
West North Central	1,322	163	32	23	5		1,063
Minnesota	170			2	4		296
Iowa	134			2			119
Missouri	695		27	9			286
North Dakota	61	53	1	1	1		23
South Dakota	83			2			27
Nebraska	62						76
Kansas	117	110	4	7			236
South Atlantic	4,391	3,738	80	60	39	59	3,275
Delaware	75	75			2		74
Maryland	626	613	6	9	5	1	854
District of Columbia					3		25
Virginia	995	978	16	13	7		491
West Virginia	506	502	2	9	1	1	635
North Carolina	937	905	11	8		1	656
South Carolina			5	9	1	1	92
Georgia	580	575	30	6	11	48	365
Florida	582		10	6	9	7	80
East South Central	2,742	1,213	43	71	9	25	1,064
Kentucky	802	772	5	13	1		328
Tennessee	940		12	36	6		483
Alabama	541		11	10	2	20	223
Mississippi	459	441	15	12		5	30
West South Central	2,672	1,460	65	103	14	50	2,863
Arkansas	419	416	24	20	1	1	490
Louisiana	602	569	13	45	5	17	53
Oklahoma	479	475	19	10	4	1	216
Texas	1,172		9	28	4	31	2,104
Mountain	1,857	1,220	18	23	4		1,663
Montana	95	87	6	3	2		39
Idaho	65			1			155
Wyoming	13	13					19
Colorado	410			5	2		301
New Mexico	296	278	6	4			202
Arizona	790	759	1	10			651
Utah	86	83	5				285
Nevada	102						11
Pacific	2,819	2,181		24	34		2,865
Washington	521			3	4		528
Oregon	171	150			1		390
California	2,127	2,031		21	29		1,947
First quarter 1950	26,349	16,688	282	447	193	136	33,578
First quarter 1949	29,423	17,751	360	486	149	179	13,056
Median 1945-49	29,423	16,809	250	466	149	548	28,897
Alaska							23
Hawaii	69				1	1	5
Panama Canal Zone [2]	4			8			105
Puerto Rico [3]	1,264			22		5	1,148
Virgin Islands							10

[1] Includes salmonellosis.

[2] Two months only.

[3] From weekly reports.

Additional Diseases

Figures for additional diseases reported by State health departments in the first quarter of 1950 and not shown in the table are given below. Also included are diseases reported by territories and possessions. The numbers in parentheses are from the Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death, World Health Organization, 1948.

Actinomycosis (*132*): Michigan 1.

Anthrax (*062*): Arkansas 1, Delaware 2, Massachusetts 1, New Hampshire 1, New York 2.

Botulism (*049.1*): California 2.

Cancer (*140–205*): Alabama 1,008, Arkansas 122, Colorado 1,032, Florida 542, Georgia 73, Idaho 363, Kansas 766, Kentucky 11, Louisiana 677, Nevada 5, New Mexico 228, North Dakota 121, Pennsylvania 2,008, South Carolina 80, Tennessee 796, Utah 91, Wyoming 98, Alaska 7, Virgin Islands 3.

Coccidioidomycosis (*133*): Arizona 45, California 18, Illinois 1, Montana 1, Oklahoma 1.

Dengue (*090*): Texas 3.

Diarrhea of newborn (*764*): California 28, Connecticut 2, Florida 23, Illinois 31, Indiana 9, Maryland 2, Michigan 14, Minnesota 7, New Mexico 2, New York 3, North Dakota 5, Ohio 14, Pennsylvania 10, Rhode Island 1, Washington 2, West Virginia 2.

Encephalitis, myelitis, and encephalomyelitis (except acute infectious) (*343*): Colorado 2, Maryland 1, Ohio 8, Utah 1, Washington 3.

Erysipelas (*052*): Arizona 1, Arkansas 1, Colorado 2, Connecticut 5, Florida 5, Idaho 8, Illinois 55, Indiana 4, Kansas 2, Michigan 21, Minnesota 3, Missouri 4, Montana 2, Nevada 2, North Dakota 5, Ohio 8, Oregon 13, Pennsylvania 11, South Dakota 1, Tennessee 4, Wisconsin 4, Alaska 1, Hawaii 2.

Favus (*131* part): Missouri 1.

Food Poisoning (*049*): California 753, Colorado 2, Connecticut 11, Florida 6, Idaho 20, Illinois 42, Indiana 4, Iowa 2, Louisiana 1, Maine 1, Minnesota 7, Nevada 2, New Mexico 11, New York 161, Ohio 18, Oklahoma 11, Pennsylvania 20, Washington 2, Alaska 13, Panama Canal Zone 1.

Glandular fever (infectious mononucleosis) (*093*): Arizona 8, Connecticut 48, Idaho 14, Kentucky 9, Maryland 7, Michigan 36, Minnesota 97, Oklahoma 2, Pennsylvania 8, Tennessee 29, Washington 14.

Hepatitis, infectious (*092*): California 120, Connecticut 2, Florida 2, Illinois 14, Indiana 22, Kansas 11, Maine 1, Maryland 1, Michigan 4, Montana 6, Nebraska 1, Nevada 1, New York 106, Oregon 84, Pennsylvania 212, Tennessee 45, Utah 1, Alaska 1, Hawaii 3, Panama Canal Zone 1.

Impetigo (*695*, *766*): Colorado 30, Idaho 3, Illinois 5, Indiana 5, Kansas 7, Kentucky 19, Maryland 1, Michigan 267, Montana 8, Nevada 28, New York 11, North Dakota 1, Ohio 84, Rhode Island 1, Washington 248, Alaska 7, Hawaii 16.

Leprosy (*060*): California 2, New York 6, Hawaii 8.

Meningitis, except meningococcal and tuberculous (*340*): Colorado 5, Idaho 3, Illinois 71, Indiana 26, Iowa 6, Kentucky 11, Maryland 10, Massachusetts 47, Michigan 10, Minnesota 11, Mississippi 28, New Mexico 8, New York 65, Ohio 32, Rhode Island 8, Utah 4, Vermont 3, Washington 17.

Ophthalmia neonatorum (*033, 765*) For reported cases of "Conjunctivitis" see table: Arizona 5, Arkansas 1, Florida 5, Georgia 1, Illinois 45, Louisiana 3, Maryland 2, Massachusetts 62, Michigan 8, Mississippi 12, New Jersey 2, New York 5, Ohio 130, Pennsylvania 2, South Carolina 1, Tennessee 2, Texas 19, West Virginia 87, Wisconsin 2.

Pellagra (*281*): Alabama 4, Arkansas 2, Georgia 14, New Mexico 2, Oklahoma 3, Tennessee 3, Virginia 1, Virgin Islands 1.

Plague (*058*): New Mexico 1.

Psittacosis (*096.2*): New York 1, Ohio 3.

Rabies (*094*): Tennessee 2.

Relapsing Fever (*071*): Nevada 1, Texas 6.

Rickettsialpox (*108*): New York City 34.

Ringworm of the Scalp (*131*, part): Arkansas 1, Connecticut 14, Florida 2, Georgia 42, Illinois 669, Indiana 1, Iowa 66, Kansas 6, Kentucky 87, Minnesota 2, Missouri 4, Montana 3, Nevada 6, New Mexico 1, Ohio 85, Oklahoma 16, Oregon 32, Pennsylvania 32, South Carolina 3, Utah 6, Virginia 34, Washington 258, Wyoming 1, Alaska 6.

Scabies (*135*): Idaho 18, Indiana 1, Kansas 23, Kentucky 75, Michigan 190, Missouri 2, Montana 2, Nevada 9, North Dakota 8, Ohio 35, Pennsylvania 235, Wyoming 3, Alaska 6.

Schistosomiasis (*123*): New York 14.

Vincent's infection (*070*): Colorado 27, Florida 17, Georgia 9, Idaho 7, Illinois 24, Indiana 3, Kansas 10, Kentucky 11, Maryland 6, Montana 2, Nevada 8, New Hampshire 2, Ohio 5, Oklahoma 29, South Dakota 2, Tennessee 16, Vermont 116, Washington 121.

Weil's disease (*072*): California 2, Louisiana 1, Michigan 5, Montana 1, Pennsylvania 1.

Rabies in animals: Alabama 98, Arizona 3, Arkansas 37, California 12, Colorado 87, Florida 19, Georgia 133, Illinois 36, Indiana 114, Iowa 52, Kansas 9, Kentucky 203, Louisiana 19, Michigan 42, Minnesota 1, Mississipi 35, New Jersey 5, New Mexico 3, New York 179, Ohio 113, Oklahoma 35, Pennsylvania 21, South Carolina 83, Tennessee 82, Texas 361, Virginia 19, West Virginia 115.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MAY 20, 1950

Influenza

Reported cases of influenza continued to decrease from the preceding week but remained above the 5-year (1945–49) median. For the current week, 1,917 cases of influenza were reported, as compared with 2,492 for the previous week and 1,317 for the corresponding week in 1949. The 5-year median was 1,100. The cumulative total for the first 20 weeks of the year was 238,219, which may be compared with the corresponding total of 69,850 for the same period last year and 294,233 for 1947, the highest on record for the past 5 years. The corresponding 5-year median was 132,320.

Other Reportable Diseases

The incidence of whooping cough continued to increase over the previous week from 2,867 to 3,018 cases reported for the week. The total for the corresponding week last year was 1,197 and the 5-year (1945–49) median was 2,026. The cumulative total for the first 20 weeks of the year was 52,995, which may be compared with the corresponding total of 20,291 for the same period last year and 55,715 for 1947, the highest on record for the past 5 years. The corresponding 5-year median was 42,016.

On a cumulative basis for 20 weeks of this year, reported cases of meningococcal meningitis numbered 1,850, as compared with 1,668 for the corresponding period in 1949 and 1,760 for the 5-year (1945–49) median. Also, on a cumulative basis for 20 weeks of this year, reported incidence of tularemia was 403, as compared with the 5-year median of 361. For the corresponding period of 1949, 478 cases were reported.

Of the 4 cases of anthrax reported, 3 occurred in Pennsylvania and 1 in Massachusetts. No smallpox was reported in the United States.

Reported cases of poliomyelitis numbered 94 for the current week, as compared with 102 last week and 101 for the corresponding period last year. Included in the current week's total for poliomyelitis, Texas reported 38 cases; California, 16 cases.

Telegraphic case reports from State health officers for the week ended May 20, 1950

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	---	---	16	19	---	10	---	---	4	---	---	---	22	---
New Hampshire	---	---	---	11	---	---	---	---	---	---	---	---	2	---
Vermont	---	---	---	24	---	---	1	---	---	---	---	---	13	---
Massachusetts	4	2	---	506	---	---	---	---	151	---	---	1	144	---
Rhode Island	---	---	---	8	---	6	---	---	5	---	---	---	57	---
Connecticut	---	---	1	242	---	33	1	---	18	---	---	---	93	---
MIDDLE ATLANTIC														
New York	4	1	---	1,644	2	232	1	---	[3] 161	---	---	3	138	15
New Jersey	---	2	[2] 1	1,722	1	33	2	1	44	---	---	---	134	---
Pennsylvania	4	---	---	1,021	6	96	4	---	134	---	---	---	171	9
EAST NORTH CENTRAL														
Ohio	1	---	8	1,002	6	59	---	---	162	---	---	---	245	7
Indiana	---	1	---	549	2	9	---	---	45	---	---	---	38	22
Illinois	---	---	14	1,359	4	146	2	---	39	---	1	---	89	5
Michigan	2	1	4	1,744	5	50	3	---	120	---	---	---	207	7
Wisconsin	---	---	53	949	5	9	---	---	36	---	---	1	102	1
WEST NORTH CENTRAL														
Minnesota	2	---	5	287	1	6	---	---	14	---	---	---	44	---
Iowa	1	---	---	256	1	2	1	---	6	---	---	---	25	21
Missouri	2	---	3	98	8	28	1	---	11	---	---	3	49	---
North Dakota	1	1	20	1	1	21	---	---	2	---	---	---	1	---
South Dakota	1	---	---	47	---	---	2	---	2	---	---	---	4	---
Nebraska	1	---	7	300	---	5	2	---	10	---	---	---	5	---
Kansas	2	2	---	35	2	22	---	---	7	---	---	---	46	2
SOUTH ATLANTIC														
Delaware	---	---	---	11	---	---	---	---	4	---	---	---	7	---
Maryland	1	---	1	103	1	33	1	---	17	---	---	2	59	---
District of Columbia	---	---	---	57	---	13	---	---	3	---	---	---	3	---
Virginia	1	---	349	174	1	68	1	3	22	---	---	---	114	3
West Virginia	---	---	43	195	4	8	---	---	7	---	---	2	64	2
North Carolina	5	---	---	180	4	---	1	1	8	---	---	2	70	---
South Carolina	2	---	3	77	1	8	---	---	4	---	---	1	19	10
Georgia	2	---	48	75	---	19	---	---	5	---	2	1	32	10
Florida	---	---	1	146	---	14	1	---	2	---	---	---	6	1

See footnotes, p. 768.

Telegraphic case reports from State health officers for the week eeded May 20, 1950—Continued

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measels	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever[1]	Whooping cough	Rabies in animals
EAST SOUTH CENTRAL														
Kentucky	1	---	17	266	---	15	1	1	13	---	---	2	44	9
Tennessee	7	---	18	189	1	---	1	3	9	---	---	---	65	3
Alabama	1	---	62	37	---	32	5	---	7	---	---	1	33	4
Mississippi	2	---	6	33	---	23	3	---	3	---	2	1	3	1
WEST SOUTH CENTRAL														
Arkansas	2	---	91	63	---	26	2	---	1	---	4	1	66	2
Louisiana	---	1	---	29	---	8	---	---	---	---	---	---	5	---
Oklahoma	1	---	40	15	---	37	1	---	9	---	1	---	22	2
Texas	16	---	876	727	5	287	38	---	21	---	2	10	294	24
MOUNTAIN														
Montana	---	---	---	58	---	1	---	1	8	---	3	---	26	---
Idaho	---	---	19	177	---	---	---	---	6	---	---	---	20	---
Wyoming	---	---	---	24	1	1	---	---	5	---	---	---	4	---
Colorado	2	1	22	168	1	15	1	---	12	---	---	---	11	---
New Mexico	---	---	1	9	---	4	1	---	5	---	---	1	32	---
Arizona	1	2	121	37	---	33	1	---	15	---	---	2	66	
Utah	---	---	2	240	---	1	---	---	3	---	1	---	29	---
Nevada	---	---	---	---	---	---	---	---	---	---	---	---	---	---
PACIFIC														
Washington	---	---	3	224	1	---	---	---	31	---	---	---	84	---
Oregon	---	---	54	10	---	23	---	1	7	---	---	3	41	---
California	3	---	8	707	4	25	16	---	82	---	---	10	140	3
Total	72	14	1,917	15,846	68	1,491	94	11	1,280	---	16	47	3,018	164
Median, 1945–49	201	8	1,100	23 635	86	---	83	18	1,897	6	20	62	2,026	---
Year to date 20 weeks	2,695	262	[4] 238,219	192,169	1,850	48,352	[5] 1,781	42	33,370	[6] 21	403	955	52,995	3,088
Median, 1945–49	5,217	166	132,320	393,154	1,760	---	880	52	50,861	127	361	993	42,016	---
Seasonal low week ends	(27th) July 9	---	(30th) July 30	(35th) Sept. 3	(37th) Sept. 17	---	(11th) Mar. 18	---	(32d) Aug. 13	(35th) Sept. 3	---	(11th) Mar. 18	(39th) Oct. 1	
Since seasonal low week	6,966	---	[4] 268,749	211,299	2,763	---	647	---	49,809	[6] 41	---	445	74,531	---
Median, 1944–45 to 1948–49	12,783	---	175,878	428,100	2,732	---	344	---	77,547	181	---	520	71,899	---

---

[1] Including cases reported as salmonellosis.

[2] New York City only.

[3] Including cases reported as streptococcal sore throat.

[4] Excludes 40,200 cases estimated by county health officers to have occurred in Kentucky during the period Jan. 1 to Apr. 8, 1950, and 4,000 cases estimated to have occurred in Jones County, Iowa.

[5] *Deduction: Kentucky, week ended Mar. 18, 1 case.*

[6] Deduction: Mississippi, week ended Apr. 22, 1 case.

Anthrax: Massachusetts 1 case, and Pennsylvania 3 cases.
Alaska: Influenza 5, pneumonia 1.
Hawaii: Influenza 2, measles 1, poliomyelitis 1.

FOREIGN REPORTS

CANADA

Provinces Notifiable diseases -Week ended May 6, 1950.—Cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis						2			1		3
Chickenpox			11		149	256	21	11	37	127	615
Diphtheria					3						3
Dysentery, bacillary						1	1			1	3
Encephalitis, infectious						1			1		2
German measles			76		15	1,422	2	78	97	374	2,064
Influenza			16			30	11				60
Measles			1	3	506	500	92	87	40	233	1,522
Meningitis, meningococcal										1	1
Mumps			70		201	422	3	67	99	290	1,155
Poliomyelitis							1	1			2
Scarlet fever			2		75	36		15	42	31	201
Tuberculosis (all forms)	20		2	7	101	36	9	3	26	37	241
Typhoid and paratyphoid fever					8	1				3	12
Venereal diseases:											
Gonorrhea	2		11	7	101	42	8	14	24	122	331
Syphilis	1	2	5	7	69	25	5	8	1	29	152
Other forms							1			2	3
Whooping cough	1		2		94	95	6	1		69	268

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India.—During the week ended May 6, 1950, 492 cases of cholera (with 325 deaths) were reported in Calcutta, and 490 cases were reported during the week ended May 13.

Pakistan.—During each of the two weeks ended April 29 and May 6, 1950, respectively, 5 fatal cases of cholera were reported in Chittagong.

Plague

Belgian Congo.—On May 3, 1950, 1 fatal case of plague was reported in Buleka, northeast of Lubero, Costermansville Province, Belgian Congo.

Burma.—During the week ended May 6, 1950, 1 fatal case of plague was reported in Rangoon.

Smallpox

Chile.—In the recent outbreak of smallpox in Chile, 2,847 cases were reported as of May 3. Provinces reporting the largest numbers of cases were Malleco 971 and Concepcion 792. During the period April 16–29, 49 cases were reported in the city of Santiago.

Gold Coast.—During the period April 8–May 5, 1950, 54 cases of smallpox, with 15 deaths, were reported in Gold Coast. Of this number 31 cases, 11 deaths, occurred in the Accra area.

Nigeria.—During the 5-week period ended April 1, 1950, 3,799 cases of smallpox were reported in Nigeria. For the week ended April 8, 850 cases were reported.

Typhus Fever

Afghanistan.—For the period March 1–31, 1950, 254 cases of typhus fever were reported in Afghanistan.

India.—During the period March 12–April 8, 1950, 136 cases of typhus fever, with 44 deaths, were reported in Jammu and Kashmir.

Spain.—During the week ended March 25, 1950, 2 cases of typhus fever were reported in Madrid, and 2 cases were reported in the city of Segovia during the week ended April 15.

Yellow Fever

Colombia.—During the period April 5–7, 1950, 2 fatal cases of yellow fever were reported at Putumayo Commissary, Mocoa Locality.

DEATHS DURING WEEK ENDED MAY 20, 1950

	Week ended May 20, 1950	Corresponding week, 1949
Data for 93 large cities of the United States:		
Total deaths	8,866	8,857
Median for 3 prior years	8,857	----------
Total deaths, first 20 weeks of year	194,841	192,659
Deaths under 1 year of age	566	590
Median for 3 prior years	590	----------
Deaths under 1 year of age, first 20 weeks of year	12,396	13,003
Data from industrial insurance companies:		
Policies in force	69,801,636	70,403,458
Number of death claims	12,326	12,276
Death claims per 1,000 policies in force, annual rate	9.2	9.1
Death claims per 1,000 policies, first 20 weeks of year, annual rate	10.0	9.7

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

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Public Health Reports

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
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Public Health Reports

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Laboratory Studies On the 1950 Outbreak of Influenza

By M. R. Hilleman, Ph.D., R. P. Mason, Lt. Col., M.C.,
and N. G. Rogers, A.B.*

During the first 3 months of 1950, a number of outbreaks of influenza were reported in military and civilian populations throughout the world. In the United States during this period, 164,352 patients were diagnosed on clinical grounds as having influenza. The results of serological and isolation procedures performed in different laboratories established that the infecting agent in a number of these outbreaks was influenza A virus, while, in a few instances, influenza B virus appeared to be of etiological significance (*1*).

The present report is concerned primarily with observations on four strains of virus which were isolated from military patients with an influenza-like disease during January 1950 in Georgia and Wyoming. These agents are closely related antigenically to each other but differ somewhat from the so-called A prime strains of influenza A.

Materials and Methods

Clinical Specimens. These were limited to nasal and pharyngeal washings collected shortly after the onset of clinical influenza and to acute phase and convalescent phase sera collected from persons during the first several days and several weeks, respectively, after initial symptoms.

Isolation of Virus. Nasal or pharyngeal washings from patients suffering from a disease clinically diagnosed as influenza were mixed with antibiotics and inoculated into the allantoic and amniotic sacs of embryonated eggs; subsequent passages were made by the allantoic route. After two or three transfers, each strain yielded allantoic fluids which had hemagglutinating titers of 1:320 to 1:1280. These fluids were infective for eggs in dilutions of 10^{-7} or 10^{-8}.

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*From the Army Medical Department Research and Graduate School, Washington, D. C. The technical assistance of S.F.C. F. Hawk, S.F.C. W. O. Blair and P.F.C. D. Thorlton is gratefully acknowledged.

Information contained in this paper was reported to the Commission on Immunization of the Armed Forces Epidemiological Board at its annual meeting, March 17, 1950.

The four 1950 strains of virus employed in the present study (Francis Warren-1-50, Francis Warren-2-50, Atlanta Headquarters-1-50 and Atlanta Depot-1-50) were used as allantoic fluid from the second to fourth passage in eggs.

Strains of Virus Isolated Prior to 1950. The following strains of influenza virus were used in the present studies. In each instance, infected allantoic fluids from the indicated passage were used throughout.

PR8. Isolated in 1934 from a patient in Puerto Rico (*2*). After one passage in ferrets, the virus was maintained through 691 passages in mice and 3 in embryonated eggs before it was procured from the Influenza Strain Study Center. The infected allantoic fluid used in this study was from the sixth and seventh egg passage.

Weiss. Isolated in 1943 from a patient at Fort Custer, Mich. (*3*). Received by this laboratory from the Biologics Control Division of the National Institutes of Health after 79 passages in mice. Transferred to eggs and used in this investigation as sixth and seventh egg-passage material.

FM1. Isolated in 1947 from a patient at Fort Monmouth, N. J. (*4*). Obtained from the Influenza Strain Study Center after 7 passages in mice and 12 in eggs. Fourteenth egg-passage material was used.

Wilfong. Isolated in 1948 from a patient in Los Angeles by Capt. C. H. Kempe of the Sixth Army Area Medical Laboratory. Originally isolated in embryonated eggs and used as allantoic fluid from the 21st and 22d passages in chick embryos.

SF-1-49. Isolated in 1949 from a patient in San Francisco by Capt. D. L. Weiss at the Sixth Army Area Medical Laboratory. Isolated and maintained exclusively in eggs. Sixth passage material was used in this study.

4 ML-1-48/49. Isolated in the winter of 1948–49 from a patient in Germany by Dr. E. Sheris at the 4th Medical Laboratory, Heidelberg. Allantoic fluids from an early but undetermined number of egg passages were used.

Lee. Isolated in 1940 (*5*) from a patient in New York State. After 8 passages in ferrets, the virus was maintained through 310 passages in mice and 3 in eggs before it was obtained from the Influenza Strain Study Center. The material used in this study was from the sixth egg passage.

All of these strains are of the A type except Lee which is type B.

Preparation of Antisera. Rooster, ferret, and mouse antisera were prepared for use in the present studies.[1] Roosters weighing from 5 to 8 pounds were injected both intravenously and intraperitoneally with 5.0 ml. amounts of virus-infected allantoic fluids having hemagglutinating titers of 1:320 or greater. Young adult ferrets were inoculated intranasally with approximately 10^4 egg infectious doses of virus. There were no signs of illness during the first week, and they were reinoculated with about 10^6 egg infectious doses of the same virus, again without obvious illness. The roosters were bled 10 days and the ferrets 2 weeks following the last injection of virus. The sera were stored at 4° C. until used. Sera obtained from the roosters and ferrets prior to immunization did not contain demonstrable antibodies against influenza virus.

---

[1] We wish to thank Dr. J. A. Morris of this department for preparing the ferret antisera and Dr. B. Eddy of the Biologics Control Division, National Institutes of Health, for the mouse antisera.

Groups of mice weighing 14 to 16 grams were injected intraperitoneally with 0.5 ml. amounts of serial fivefold dilutions (1:5–1:3125) of influenza vaccine lot 22A. This vaccine was a commercial product containing PR8 and FM1 strains of A virus and Lee strain of B virus. The mice were bled 2 weeks later, and the sera were stored in the frozen state until used.

Hemagglutination Techniques. The hemagglutination and hemagglutination-inhibition titrations were performed by the standard diagnostic procedure recommended by the Committee on Serological Procedure of the Armed Forces Epidemiological Board (*6*). Type "O" human erythrocytes were used in these tests.

Titration of Virus Infectivity. Titrations to determine the infectivity of allantoic fluids were performed by inoculating groups of six embryonated eggs via the allantoic cavity with 0.1 ml. amounts of serial tenfold dilutions of material to be tested. The presence or absence of hemagglutinin in fluid from each egg following 2 days' incubation at 35° C., as determined by the spot plate method (*4*), indicated whether or not infection had occurred. The ID_{50} were calculated by the method of Reed and Muench (*7*).

Neutralization Tests. Neutralization tests with rooster and ferret antisera were performed in the following manner: Serial fourfold dilutions of serum, inactivated at 56° C. for 30 minutes, were mixed with equal volumes of virus suspensions diluted to contain approximately 1000 ID_{50} in 0.1 ml. The serum-virus mixtures were held at 37° C. for 30 minutes and then were inoculated in 0.1 ml. amounts into the allantoic cavities of embryonated eggs. After incubating for 2 days, the presence or absence of hemagglutinin in the eggs was determined as already described. The neutralizing titer was taken as that dilution of serum in which the majority of eggs were protected from infection.

Neutralization tests with mouse antisera were performed in eggs by the method described for rooster and ferret sera except that constant amounts of serum diluted 1:5 were employed in place of the serial dilutions of serum.

Experimental

Evidence for Influenza A Infection in 1950. Table 1 presents the results of agglutination-inhibition tests using acute and convalescent sera from patients in the Georgia and Wyoming outbreaks and antigens prepared from a number of strains of influenza A virus and one strain of influenza B virus. It is evident from the tabular data that influenza A and not influenza B was the virus involved in these cases.

The mean titers of inhibitory antibody for PR8 and FM1 viruses in the acute phase sera were appreciably higher than for the 1950 strain. The mean titers for the convalescent sera, on the other hand, were of approximately the same magnitude. Therefore, even though the convalescent serum titers were essentially the same, the number of cases showing fourfold or greater rise in serum titer was different in the tests with the several antigens. Nine of the 12 sera showed fourfold or greater rise in titer in tests with AD-1-50 and 8 of the 12 with FM1 virus, while only 5 of these sera showed such a rise with PR8 virus.

Table 1. *Agglutination-inhibition tests with paired sera from patients with influenza*

Patients from the Georgia and Wyoming outbreaks, January 1950	Fold-increase in serum titer			
	Type A antigens			Type B antigen
	PR8 (1934)	FM1 (1947)	AD-1-50 (1950)	Lee (1940)
1 (AH-1-50)	2	4	8	0
2 (FW-2-50)	2	16	16	0
3 (AD-1-50)	2	4	2	0
4 (FW-1-50)	2	2	4	0
5	8	16	32	0
6	8	8	32	0
7	8	8	32	−2
8	16	32	64	−2
9	16	16	32	4
10	0	2	8	0
11	0	0	−2	−2
12	2	0	0	2
Geometric mean titer:				
Acute phase serum	1:80	1:80	1:20	1:160
Convalescent serum	1:320	1:640	1:320	1:160
Fold-increase	4×	8×	16×	0×
Number of $\frac{\text{Positive Cases}}{\text{Total Cases}}$	5/12	8/12	9/12	

Comparison of Influenza Virus Strains by the Agglutination-Inhibition Technique. The titration results of hemagglutination-inhibition tests using sera of roosters immunized against strains of influenza A virus isolated since 1934 and homologous and heterologous antigens are presented in table 2. These same data are summarized in interpretive form in table 3. It is evident from the tabular data that the strains of influenza A employed in these tests, and considered to be representative of the virus during the period from 1934 to the present, show progressive change in antigenic structure. It is of interest that the strains from 1947 and 1948 react in a manner which suggests that they are essentially identical. Of the two, however, the 1948 strain is perhaps more closely related to the viruses recovered in 1949 and 1950. Furthermore, the 1949 and 1950 strains appear to be identical to each other and to have practically all of the antigenic components of the strains from the 2 preceding years. However, they seem to possess additional factors since antisera against the 1947 and 1948 strains give higher titers with their homologous antigens than with the 1950 antigens.

While the influence of numerous passages (*8*, *9*) of the older strains in animals and eggs cannot be assessed, this factor would appear to be of minor importance in strains isolated since January 1947. Whatever the relationship of the current PR8 and Weiss viruses to the strains isolated from patients in 1934 and 1943, it is clear that these viruses have little relationship to the more recently isolated strains.

Table 2. *Agglutination-inhibition tests using influenza antigens and rooster antisera*

Rooster antiserum against:	Serum titers obtained using antigens:									
	PR8	Weiss	FM1	Wilfong	SF-1-49	4ML-48/49	AD-1-50	FW-1-50	AH-1-50	FW-2-50
PR8 (1934)	*800	50	50	**0	0	0	0	0	0	0
PR8 (1934)	*800	100	0	0	0	0	0	0	0	0
Weiss (1943)	200	*800*	100	50	0	0	0	0	0	0
FM1 (1947)	50	100	*800	400	100	100	100	100	100	100
Wilfong (1948)	50	100	800	*400*	200	400	200	200	200	200
SF-1-49	0	0	400	400	*400*	400	400	400	200	200
AD-1-50	0	0	800	400	400	400	*400*	400	200	200
FW-1-50	0	0	800	400	800	800	800	*800*	400	400
AH-1-50	0	100	800	800	800	800	800	800	*800*	800

*These sera, having titers of 1:1600 or 1:3200, were initially diluted 1:2 or 1:4 in the tests to bring their titers to a level comparable with that of other sera used.

**(0) Titer less than 1:50, the lowest dilution tested.

Table 3. *Interpretive summary of agglutination-inhibition tests showing relationships of influenza type A strains according to year of isolation*

(Based on results of table 2)

Rooster antisera against strains isolated in:	Antigens from strains isolated in:					
	1934	1943	1947	1948	1949	1950
1934	++++	+	±	0	0	0
1943	++	++++	+	±	0	0
1947	±	+	++++	+++	+	+
1948	±	+	++++	+++	+++	++
1949	0	0	++++	++++	++++	++++
1950	0	0	++++	++++	++++	++++

The results of tests with ferret antisera and various viral antigens (table 4) are essentially intermediate between those obtained with rooster and with human antisera. However, they tend to support the differences noted when chicken sera were employed. The somewhat broader range of serological activity shown by ferret sera was perhaps to be expected since the susceptible ferrets received infectious material on two occasions, whereas, the resistant chickens received only a single inoculation.

Protective Effect of Sera from Immune and Vaccinated Animals. The results of neutralization tests with rooster and ferret sera, summarized in table 5, showed an appreciable difference between FM1 virus and the current strains of influenza. The degree of difference exhibited in neutralization tests with rooster antiserum was slightly greater than that demonstrated by the hemagglutination-inhibition test. The two types of tests brought out differences of a similar degree when ferret antisera were employed.

Since such a marked antigenic difference existed between the FM1 and 1950 viruses, it was of interest to determine whether animals injected with standard polyvalent influenza vaccine (which contains PR8, FM1, and Lee antigens) would develop protective antibodies against the 1950 strains. The results presented in table 6 indicate that moderate protection was afforded against the homologous strains of virus but there was no protection against the current strains.

Table 4. *Agglutination-inhibition tests using influenza antigens and ferret antisera*

Ferret antiserum against:	Serum titers obtained using antigens:								
	PR8	Weiss	FM1	Wilfong	SF-1-49	4ML-48/49	AD-1-50	FW-1-50	AH-1-50
PR8 (1934)	*640*	640	80	*0	0	0	0	0	0
Weiss (1943)	640	*640*	160	40	10	10	10	10	10
FM1 (1947)	80	20	*640*	160	160	160	160	160	160
AD-1-50	10	10	640	320	320	640	*640*	640	640
FW-1-50	20	0	640	640	640	640	640	*640*	640
AH-1-50	20	0	640	640	640	640	640	640	*640*

*(0)=Titer less than 1:10, the lowest dilution tested.

Table 5. *Egg neutralization tests with FM1 antisera and 1950 strains of virus*

Virus strain	Dilution of serum neutralizing 500 ID_{50} of virus	
	Rooster serum	Ferret serum
FM1	1:6400	1:160
AD-1-50	1:100	1:400
FW-1-50	1:100	
AH-1-50	1:400	1:400

Table 6. *Assay of standard (NIH) influenza vaccine using homologous and heterologous strains of challenge virus*

Dilution of vaccine injected into donor mice	Results of neutralization tests in eggs with challenge virus					
	PR8	FM1	AD-1-50	FW-1-50	AH-1-50	Lee
1:5	*0/7	0/7	5/6	6/6	7/7	0/
1:25	2/7	1/7	7/7	7/7	7/7	3/
1:125	4/6	7/7	7/7	7/7	7/7	5/
1:625	7/7	7/7	7/7	7/7	7/7	7/
Dilution of virus used	$10^{-4.0}$	$10^{-5.0}$	$10^{-5.0}$	$10^{-5.0}$	$10^{-4.0}$	10^{-4}
Control virus titration ID_{50}	$10^{-7.8}$	$10^{-8.0}$	$10^{-7.5}$	$10^{-7.8}$	$10^{-8.0}$	10^{-7}

*Numerator=Number of eggs infected. Denominator=Total number of eggs.

Discussion

The data clearly indicate that considerable antigenic difference exists between the current strains of influenza virus and the PR8 and FM1 strains recovered during epidemics in previous years.

It would appear that progressive and continuous antigenic change has been occurring under natural conditions in some strains of influenza A virus which have infected man during recent years. Even though the rate of progress of this change during the last 4 years would appear to have been relatively slow, it is nevertheless appreciable. Indeed, these laboratory studies have shown that the differences are sufficiently great to warrant serious consideration of the elimination of older strains of virus from the vaccines and diagnostic antigens and the substitution of more recently isolated agents in their place. In any case, a periodic revision of the components in diagnostic and immunizing influenza materials seems indicated in order that the strains used may more closely resemble the current strains infecting man.

Summary

The results of hemagglutination-inhibition and protective tests indicated that a number of strains of influenza A virus recovered in 1950 differed antigenically from those isolated in previous years.

The changing antigenic structure of strains of influenza virus affecting man appears to progress slowly but steadily. Over a number of years, the divergence is sufficient so that the earlier isolated strains elicit few protective antibodies against the newly isolated ones.

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Salmonella in Hen Eggs

By Mary June Carter, M. S., Marcus P. Powell, M. S., C. E.,
and Irving H. Borts, M. D.

The purpose of this study was to determine the presence of *Salmonella* in fresh hen eggs by periodical sampling of the raw eggs being prepared for consumption in a local institution. No attempt was made to distinguish between shell contamination and internal contamination of the egg. The technique of breaking the eggs to obtain cultures was the same as that used by the cook in the ordinary course of kitchen duties.

Review of Literature

The presence of *Salmonella* organisms has been reported in hen, turkey, duck, goose, and pigeon eggs. However, less information is available in the literature concerning the occurrence of *Salmonella* in hen eggs or their products.

Edwards and Bruner (*1*), Chase and Wright (*2*), Buxton and Gordon (*3*), Scott (*4*), and Savage (*5*) have reported on the incidence of *Salmonella* in chickens.

Tanner (*6*), Rettger et al. (*7*), Haines and Moran (*8*), Solowey et al. (*9*), and Schneider and his co-workers (*10*) have demonstrated different modes of infection, including an infected ovary and penetration of the shell by the organism.

Crowe (*11*), Mitchell and his co-workers (*12*), Brown, Combs, and Wright (*13*), Greenblatt et al. (*14*), Stewart and Slack (*15*), Verder and Sutton (*16*) have described numerous vehicles of transmission of the organism. Watt (*17*) has described an outbreak of 28 cases of food poisoning due to *Salmonella montevideo* on board a merchant vessel. The organism was probably in the salad mayonnaise made from raw hen eggs. This species was isolated from the shells of 2 cases of unused eggs obtained from the ship. These eggs, which were taken on board ship 2 months previously, were traced to a carload originating in southern Iowa. Three egg-grading plants had contributed to this shipment. At the time of Watt's report, more than 5,000 eggs from 850 farms had been cultured in an attempt to determine the extent and location of infection among poultry flocks.

The studies upon which this report is based were made under the auspices of the Department of Hygiene and Preventive Medicine, State University of Iowa, Iowa City.

Experimental Procedure

This study was made on fresh eggs which were purchased in 30-dozen lots for use in a local institution. The routine procedure of the institution in using eggs was to immerse 1 dozen eggs at a time in hot water (120° to 122° F.) for 2 minutes. The water was then drained, and the eggs were broken into a mixing bowl and beaten with a dover-type egg beater. This procedure was followed in the experiment by the senior author.[1] A 30-ml. sample of the egg melange was pipetted into a covered beaker. Then, 0.5 ml. of blended egg mixture was pipetted into 10 ml. of tetrathionate broth (Difco) and incubated at 37° C. for 7 days. In preliminary studies, a 2- to 4-day incubation period was found inadequate; hence, a 7-day incubation period was adopted. At the end of the incubation period, a loopful of the inoculated tetrathionate broth was plated to eosin methylene blue agar and to bismuth sulfite agar and incubated at 37° C. for 48 hours.

Suspicious colonies were picked and stained by Gram's method.

Typical colonies from eosin methylene blue agar or bismuth sulfite agar were transferred to Kligler's iron agar and incubated 48 hours. A loopful of growth from Kligler's was transferred to the following: 2 meat infusion agar slants for stock cultures; dextrose, mannite, maltose, lactose, xylose, sucrose, dulcite, and salicin for fermentation tests; tryptose broth with lead acetate paper for H_2S production; tryptose broth for motility; tryptone broth for Kovac's indole test; gelatin plate plus ammonium sulfate solution for gelatin liquefaction; litmus milk; and buffered-peptone solution for acetyl methyl carbinol test.

Results

In this study all cultures diagnosed as positive were forwarded for confirmation and typing to the *Salmonella* Center, Agricultural Experiment Station of Kentucky, Lexington.

Of the 186 samples representing 247 dozen, or 2,964 eggs, numbers 6, 25, 26, 27, 153, and 157 were identified as *Salmonella* (see table). Culture number 6 was found to be *Salmonella paratyphi B*, a gram-negative, hydrogen sulfide-producing organism. It produced acid and gas in dextrose, mannite, maltose, xylose, and dulcite but did not ferment lactose or sucrose, nor produce indole. The culture *S. paratyphi B* recovered from the eggs belonged to the tartrate negative or human type. In his letter confirming the identification of this organism, Dr. P. R. Edwards commented as follows: "Relatively few human-type cultures of *S. paratyphi B* are found in animals. We have only two or three from chickens. I believe the isolation of this organism from eggs is a most significant thing."

Culture numbers 25, 26, 27, 153, and 157 were *Salmonella pullorum*.

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[1] The senior author is not a *Salmonella* carrier.

Reactions of positive cultures

Sample No.	Place	Gram's stain	Kligler	H_2S	Motility	Dextrose	Mannite	Maltose	Lactose	Xylose	Sucrose	Dulcite	Salicin	Indole	Gelatin	Litmus milk
6	A	–	AG	++	+	+	+	+	–	+	–	+	(*)	–	(*)	(*)
25	B	–	AG	+	+	+	+	–	–	+	–	–	–	–	–	Slightly acid without coagulation.
26	B	–	AG	+	+	+	+	–	–	+	–	–	–	–	–	Slightly acid.
27	B	–	AG	+	+	+	+	–	–	+	–	–	–	–	–	Do.
153	A	–	AG	+	+	+	+	–	–	+	–	–	–	–	–	Do.
157	A	–	AG	+	+	+	+	–	–	+	–	–	–	–	–	Do.

*Stock culture died before these tests were made.

They produced acid and gas in dextrose, mannite, and xylose but did not ferment maltose, lactose, sucrose, dulcite, or salicin. They did not produce indole or acetyl methyl carbinol, liquefy gelatin, or coagulate milk.

The eggs used in this series of experiments were handled exactly as the cook would have handled them up to the taking of the samples. The senior author was examined and proved not to be a *Salmonella* carrier. Hence positive cultures could have originated only within the eggs or on the shells. The recovery of a few positive cultures opens epidemiologic possibilities, whether the organisms were within the eggs or were on the shells. If the latter were true, the routine procedure followed by the cook failed in these instances to damage the contaminating organisms.

In any event, the use of uncooked hen eggs, e. g., in eggnogs and mayonnaise, is not without a certain amount of hazard from pathogenic *Salmonella.*

Conclusions

1. One hundred eighty-six samples representing 247 dozen, or 2,964 eggs, taken from 56 cases (30 dozen per case) were examined. Positive cultures were obtained from 6 samples (or 3.2 percent of the samples). Each positive sample came from a mixture of 1 dozen eggs.

2. *Salmonella paratyphi B* was recovered from 1 sample and *Salmonella pullorum* from the remaining 5.

3. Under the procedure, the infection could come only from the contents or from the shells of the eggs.

4. Although hen eggs, as a source of *Salmonella* infection, have been incriminated in only a few instances, the possibility of the transmission of this organism by serving uncooked eggs should be recognized. The finding in this study that 3.2 percent of the lots tested contained *Salmonella* emphasizes that the potential hazard of infection from uncooked eggs is greater than heretofore has been recognized.

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Prevalence of Poliomyelitis in 1949

By C. C. Dauer, M. D.*

Prevalence in the United States. In 1949 the incidence of poliomyelitis cases was higher than in any previous year if only the number of reported cases is considered. However, the case rate per 100,000 population was lower than in 1916 when 44 States reported 29,061 cases as shown in table 1. In spite of the descriptions that 1949 was the "worst polio year" in the history of the country, there are certain data which suggest a less gloomy picture.

Table 1. *Number of poliomyelitis cases and deaths reported, and morbidity and mortality rates per 100,000 population for certain years in the United States*

Year	Total cases reported	Number States reporting	Case rates per 100,000 population	Number deaths registered	Number States reporting	Death rates per 100,000 population
1916	29, 061	44	30. 2	7, 130	26	10. 6
1925	5, 926	44	5. 6	1, 492	40	1. 5
1927	10, 533	48	8. 9	2, 013	41	1. 9
1931	15, 790	43	14. 6	2, 096	47	1. 8
1945	13, 619	48	10. 3	1, 186	48	. 9
1946	25, 191	48	18. 0	1, 845	48	1. 3
1947	10, 734	48	7. 4	580	48	. 4
1948	27, 680	48	18. 9	1, 895	48	1. 3
1949	[1] 42, 174	48	28. 3	--------	--------	[2] 1. 6

[1] Provisional.
[2] Rate based on a 10-percent sample of deaths by National Office of Vital Statistics.

The death rate from poliomyelitis in 1949 has been estimated by the National Office of Vital Statistics to have been about 1.6 per 100,000 population. As shown in table 1, the death rate was higher in 1916, 1927 and 1931, and almost as high in 1925 as it was in 1949; however, the numbers of cases reported were much lower than the number reported in 1949. This would appear to indicate that either the disease was less severe in 1949, or that many more nonparalytic cases were being included in the total number of cases reported, or that some other infectious diseases possibly were being called poliomyelitis.

Prevalence in States. The incidence in the various States in 1949 is shown in table 2, and for comparison the morbidity rates for the previous 5 years are included. This tabulation shows that only the six States, Maine, Massachusetts, Connecticut, Michigan, Arkansas and Oklahoma, had significantly higher morbidity rates in 1949 than

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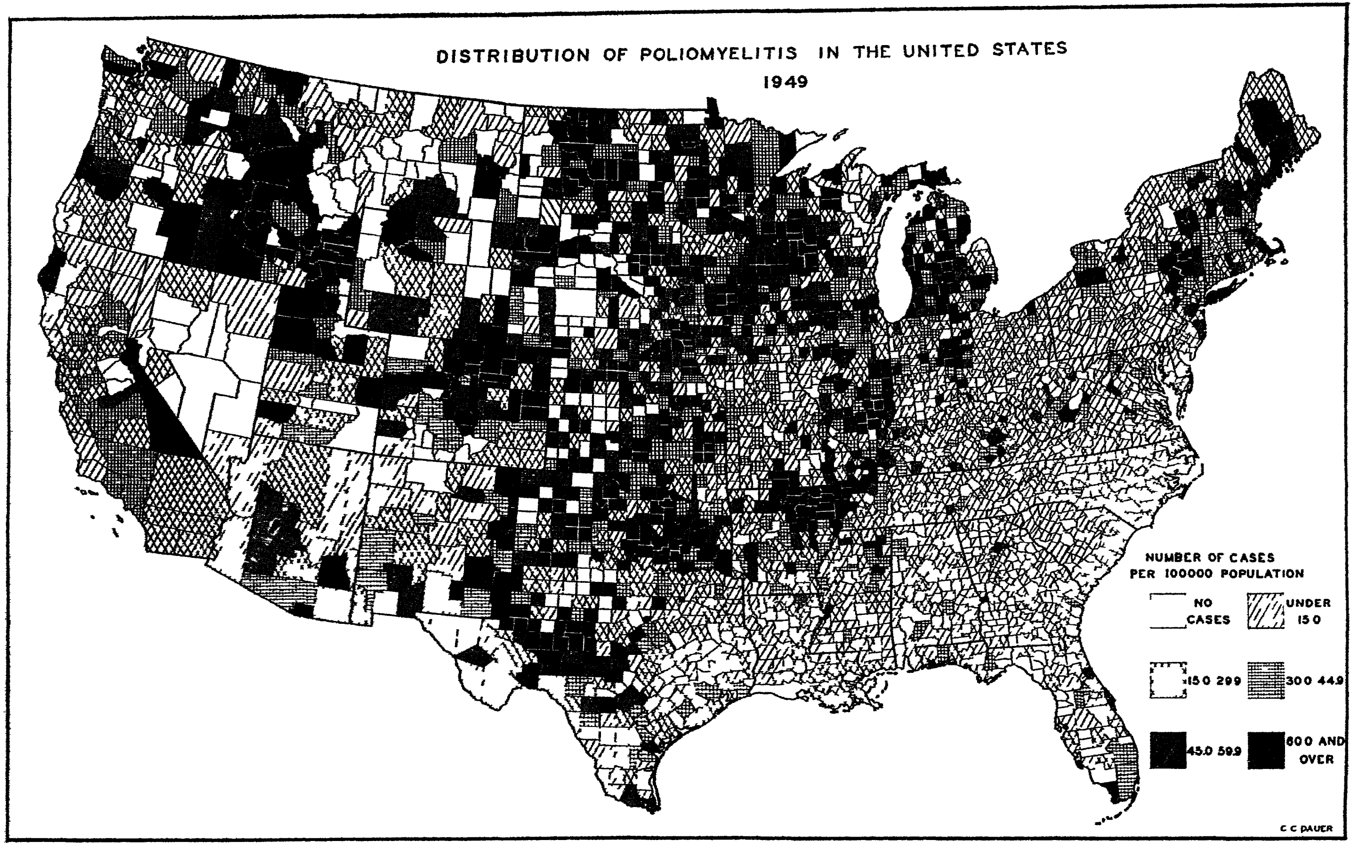
Table 2. *Number of poliomyelitis cases reported in 1949; and morbidity rates per 100,000 population by States, 1944–49*

States by division	Cases reported 1949	Morbidity rates					
		1949	1948	1947	1946	1945	1944
New England:							
Maine	117	13.2	4.4	4.8	5.1	11.3	2.7
New Hampshire	225	41.4	4.4	5.5	41.5	7.5	15.0
Vermont	153	41.5	0.9	10.9	23.2	19.3	13.3
Massachusetts	1,805	38.3	3.7	7.3	9.2	12.6	10.6
Rhode Island	193	26.0	1.1	18.9	11.9	1.9	1.8
Connecticut	655	32.4	6.0	6.6	6.8	11.9	12.5
Middle Atlantic:							
New York	5,241	36.4	9.7	8.4	10.8	14.4	48.9
New Jersey	1,518	31.2	16.9	6.6	6.1	22.6	13.5
Pennsylvania	842	7.9	7.5	4.6	3.7	8.5	15.7
East North Central:							
Ohio	1,803	22.6	15.0	18.8	10.4	6.7	17.1
Indiana	1,150	28.8	9.8	6.7	13.2	5.9	9.9
Illinois	2,842	33.6	12.7	10.3	33.1	14.3	7.4
Michigan	2,914	45.9	12.4	10.4	19.9	3.9	16.4
Wisconsin	1,164	34.7	18.3	6.2	43.0	20.2	9.3
West North Central:							
Minnesota	1,889	63.5	47.0	8.7	127.4	11.5	22.1
Iowa	1,221	46.2	48.0	6.7	28.0	19.1	9.0
Missouri	1,326	33.7	8.1	3.4	35.6	8.4	5.3
North Dakota	451	74.5	13.2	13.4	88.6	3.2	9.9
South Dakota	408	62.9	142.8	4.6	68.4	3.8	1.5
Nebraska	681	53.0	55.1	15.4	53.9	10.0	5.5
Kansas	741	38.1	16.1	4.7	61.4	7.4	6.9
South Atlantic:							
Delaware	46	14.8	43.1	39.2	11.1	10.1	33.9
Maryland	285	12.2	8.0	4.9	6.1	6.0	25.6
District of Columbia	[1] 106	[1] 12.3	15.1	2.7	4.0	14.8	21.5
Virginia	336	10.8	18.8	5.8	4.6	10.9	21.3
West Virginia	348	17.9	9.3	7.8	3.3	3.8	12.8
North Carolina	247	6.4	67.4	8.1	4.4	4.5	26.7
South Carolina	110	5.5	19.0	3.4	1.1	9.9	3.1
Georgia	229	7.2	7.2	2.5	5.1	4.0	3.5
Florida	281	11.3	16.3	4.7	23.9	6.0	5.0
East South Central:							
Kentucky	695	24.0	7.1	4.6	4.4	2.6	30.1
Tennessee	541	16.7	11.9	5.5	6.3	15.2	4.7
Alabama	253	8.7	7.2	1.7	13.4	5.4	3.8
Mississippi	358	16.8	7.7	2.9	16.4	3.8	6.4
West South Central:							
Arkansas	964	50.6	7.6	4.3	22.9	3.9	2.5
Louisiana	228	8.7	6.5	2.1	15.5	5.5	6.8
Oklahoma	1,313	57.0	15.3	2.4	21.3	9.8	2.7
Texas	2,355	31.3	34.4	2.5	14.4	14.7	3.8
Mountain:							
Montana	98	18.8	12.9	5.1	28.1	17.9	8.3
Idaho	510	86.1	23.0	72.1	9.6	4.8	3.2
Wyoming	120	42.3	29.8	6.6	49.4	9.7	4.2
Colorado	689	55.1	10.7	5.8	80.3	13.0	6.0
New Mexico	196	33.3	13.8	7.6	31.0	4.7	4.7
Arizona	180	24.2	26.0	5.5	23.3	4.0	6.0
Utah	299	43.8	32.3	4.4	24.0	41.3	4.2
Nevada	28	16.1	13.4	5.0	10.0	6.8	7.1
Pacific:							
Washington	504	21.0	15.5	7.6	24.8	15.9	10.7
Oregon	327	18.8	13.4	7.2	12.8	5.7	20.4
California	2,779	26.1	57.7	8.9	24.8	10.3	6.2

[1] Final figure.

had been reported during the previous 5 years, i. e., a rate which was more than 20 points higher. In the New England area, there had been no widespread outbreak of the disease for a number of years, but the morbidity rates were considerably lower than those of certain States in the Midwest and Rocky Mountain regions where outbreaks had occurred as recently as 1946 or 1948.

Prevalence in Counties. The distribution of poliomyelitis by coun-


DISTRIBUTION OF POLIOMYELITIS IN THE UNITED STATES
1949

ties in 1949 is shown on the map. While the disease was epidemic over a large area in the central part of the country, there was a distinct tendency toward grouping of counties with relatively high morbidity rates and some intervening groups with few or no cases. Two smaller areas, one in the extreme northeast section and the other in the northern Rocky Mountain region also had relatively high rates, especially in the latter group.

There were 24 counties with populations of 10,000 or more (1943 estimate) which had rates in excess of 200 per 100,000 population, most of them located in the North Central States. In addition to these, 36 counties with populations under 10,000 had rates in the same range. In the latter group, several had populations so small that excessively high rates could have been a matter of chance occurrence in one or two places. The incidence in one of the 24 counties is worth reviewing. Tom Green County in the west central part of Texas began to report cases in July 1948 and continued to do so throughout each of the subsequent fall and winter months; the peak in incidence was reached in June 1949 when 103 cases were reported. A steady although decreasing number of cases was reported throughout the remainder of 1949, and reports continued into the first 3 months of 1950. Thus in this population of nearly 40,000 persons, two-thirds of whom live in San Angelo, a total of 430 cases of poliomyelitis were reported from June 1948 through March 1950. The rate in Tom Green County in 1949 was slightly more than 800 per 100,000 population, but over a period of 22 months 1 percent of the population was reported to have had the disease. Korns (*1*) reported an incidence rate of over 800 for the first 9 months in a village in upper New York State, but in this instance the cases were reported principally in August and September 1949.

Of the 24 counties with relatively high rates, none had been entirely free of the disease for 5 consecutive years just prior to 1949. Eight had reported cases during each of the preceding 5 years, and an equal number had a morbidity rate of 100 or more during 1 of these 5 years. None of the 24 counties with rates of 200 or more had a population in excess of 100,000 which is consistent with the view that severe epidemics tend to occur more frequently in communities which are predominantly rural. However, Gilliam (*2*) reported only a slightly greater probability of epidemics in counties with the smaller populations located in northern States.

Prevalence of Other Central Nervous System Virus Infections. There are definite indications that infections due to viral agents other than the poliomyelitis virus are being erroneously diagnosed and reported as nonparalytic poliomyelitis. Kilham (*3*) reported on a series of 17 cases occurring in Massachusetts in 1948, in which there was a diagnosis of nonparalytic poliomyelitis. Six of the 17 appeared to have mumps meningoencephalitis as shown by serological tests and recovery of mumps virus from the spinal fluid in 3 of the 6. He also commented upon the greater frequency of mumps meningoencephalitis without parotitis during the summer months. Without appropriate serological tests or recovery of mumps virus, a distinction cannot be made between this infection and nonparalytic poliomyelitis because clinical symptoms are quite similar.

Another virus infection resembling nonparalytic poliomyelitis in man was first reported in 1948 by Dalldorf and Sickles (*4*) from upper New York State. Subsequent reports by other investigators have appeared which suggest a fairly wide distribution of the virus, now commonly called the Coxsackie virus, or rather a group of viruses since there are at least two distinct strains. The infection appears to be present mainly in the summer time and like poliomyelitis, the agent can be recovered from the throat and feces of infected persons. Persons from whom the virus has been recovered have had clinical symptoms which are similar to those seen in nonparalytic poliomyelitis, and these viruses have been reported from three persons in Nassau County, New York, who had extensive paralytic poliomyelitis. Most essential features of the epidemiology of Coxsackie virus infections are still to be worked out. However, presence of the virus can be determined more easily than in poliomyelitis because suckling mice injected with infectious material show a typical pathological picture, namely, a degeneration of muscle fibers.

The extent to which these virus infections, erroneously diagnosed as nonparalytic poliomyelitis contribute to the total number of poliomyelitis cases reported is a matter of conjecture. Since mumps is endemic in many communities and epidemic only at intervals of 7 or 8 years, it is probable that this infection contributes only a limited number of erroneously diagnosed cases, depending on time and place. Not enough is known of the epidemiology of the Coxsackie group of virus infections to warrant an estimate of the number it contributes. The fact that the virus has been isolated from persons in the New England States, New York State, Ohio, North Carolina, Texas (*5*), and the metropolitan area of Washington, D. C., including Montgomery County in Maryland and nearby Virginia (*6*), and Alabama, Colorado, Delaware, Florida, Georgia, Louisiana, Oklahoma, South Dakota and Tennessee (*7*) suggests that it is widespread and accounts for a significant number of erroneously diagnosed cases of nonparalytic poliomyelitis.

The presence of these virus infections clinically indistinguishable from nonparalytic poliomyelitis makes it apparent that as the proportion of nonparalytic cases increases, the need for caution in interpreting morbidity data becomes more imperative. The contention of Leake and others is more pertinent than ever, namely, that comparisons of poliomyelitis morbidity in different places and at different times be made by using only paralytic cases.

Summary

The incidence of poliomyelitis in 1949 was high in the United States as indicated by the number of reported cases, but the provisional death rate was relatively low. There is reason to believe that an unknown number of cases reported as nonparalytic poliomyelitis may have been instances of other viral infections.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MAY 27, 1950

Reported cases of influenza continued to decline but remained above the 5-year (1945–49) median. A total of 1,259 cases was reported for the current week as compared with 1,917 for the previous week, and 871 for the corresponding week in 1949. The 5-year median was 871.

The cumulative cases of influenza for the first 21 weeks of the year were 239,478, which may be compared with the corresponding totals of 70,721 for 1949, and 295,843 for 1947, the highest on record for the past 5 years. The corresponding 5-year median was 133,138.

A decrease from the previous week was noted in the incidence of whooping cough, from 3,018 reported cases to 2,852 for the current week. The 5-year (1945–49) median was 1,914. The cumulative total for the first 21 weeks of the year was 55,847 as compared with the corresponding total of 21,430 for the same period last year; and 43,471 for the 5-year median.

The total number of reported cases of acute poliomyelitis was 103 for the current week, as compared with 94 last week, and 102 for the week ended May 13. The corresponding figure last year was 168; and the 5-year (1945–49) median, 77. For the current week Texas reported 39 cases; and California reported a decrease from 16 to 9 for the preceding week.

Reported cases of typhoid and paratyphoid fever increased from 47 for the previous week to 75 this week. The 5-year (1945 49) median was 65. On a cumulative basis for the first 21 weeks of the year there were 1,030 cases reported as compared with 988 for the corresponding period last year, and 1,080 for the 5-year median. Tularemia increased from 16 cases last week to 18 this week, but remained below the 5-year median of 20.

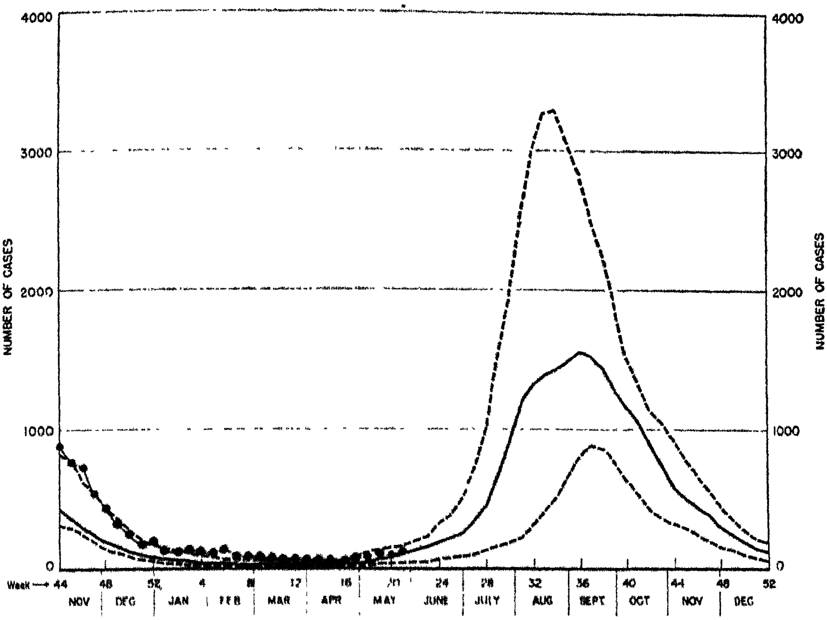
Decreases compared with the preceding week were indicated for the following diseases: Diphtheria (72 to 67), measles (15,846 to 15,066), meningococcal meningitis (68 to 62), and scarlet fever (1,280 to 1,139).

Two cases of anthrax were reported, one each in Connecticut and New Jersey. No cases of smallpox were reported in the United States.

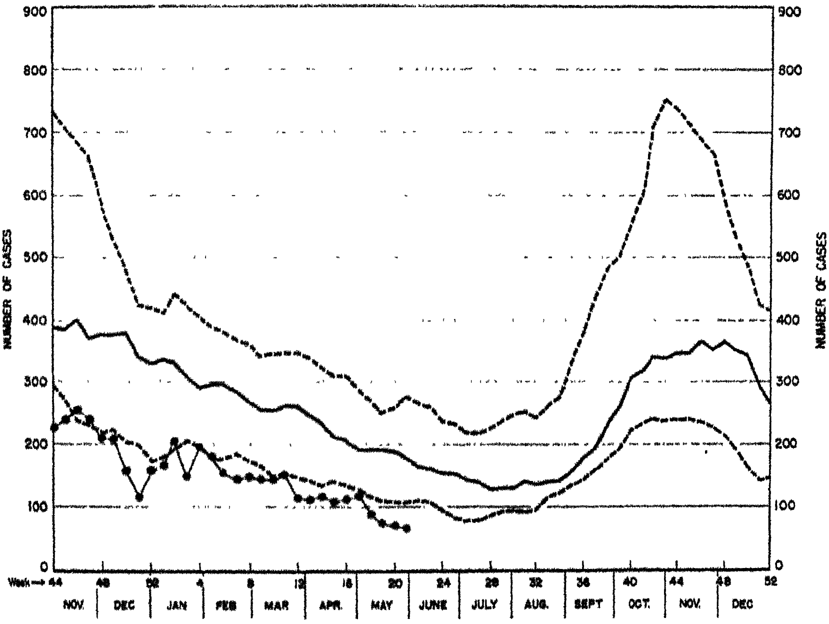
Communicable Disease Charts

All reporting States, November 1949 through May 27, 1950

ACUTE POLIOMYELITIS



DIPHTHERIA



The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 5 preceding years. The solid line is the median figure for the 5 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1949–50.

Telegraphic case reports from State health officers for the week ended May 27, 1950

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	---	---	3	21	---	13	---	---	6	---	---	---	32	---
New Hampshire	---	---	---	5	---	---	---	---	5	---	---	---	9	---
Vermont	---	---	15	3	---	---	---	---	---	---	---	---	29	---
Massachusetts	---	---	---	571	---	---	---	---	172	---	---	---	134	---
Rhode Island	---	---	---	4	---	7	---	---	5	---	---	1	94	---
Connecticut	---	---	1	328	---	50	---	---	29	---	---	---	112	---
MIDDLE ATLANTIC														
New York	1	3	[2] 3	1,689	7	211	7	---	[3] 195	---	---	1	123	25
New Jersey	---	---	---	1,619	1	57	1	1	35	---	---	1	118	---
Pennsylvania	4	1	---	1,118	1	65	---	1	98	---	---	1	135	2
EAST NORTH CENTRAL														
Ohio	2	---	2	769	3	78	---	---	115	---	---	---	220	7
Indiana	2	---	1	222	1	---	1	1	10	---	---	1	26	---
Illinois	---	1	4	1,530	5	78	3	---	43	---	---	---	109	1
Michigan	1	3	---	1,244	1	17	1	---	67	---	---	---	127	3
Wisconsin	---	---	31	833	1	6	1	---	36	---	---	---	115	---
WEST NORTH CENTRAL														
Minnesota	2	---	2	335	2	9	---	---	18	---	---	1	41	---
Iowa	1	---	---	185	---	1	6	---	11	---	---	---	35	14
Missouri	3	---	3	83	1	9	2	---	4	---	---	3	53	---
North Dakota	---	---	12	3	1	14	---	---	2	---	---	1	4	---
South Dakota	---	---	---	29	---	---	---	---	---	---	---	---	11	---
Nebraska	---	---	---	268	---	---	3	---	2	---	---	---	2	---
Kansas	1	---	1	84	2	7	---	---	9	---	---	---	35	---
SOUTH ATLANTIC														
Delaware	---	---	---	9	1	---	---	---	3	---	---	---	3	---
Maryland	1	---	2	81	3	28	---	2	12	---	---	2	36	---
District of Columbia	---	---	3	44	1	[4] 35	---	---	6	---	---	---	3	---
Virginia	2	---	153	157	---	46	1	1	13	---	---	3	65	3
West Virginia	1	---	35	234	1	21	---	1	4	---	---	2	46	15
North Carolina	4	2	---	172	3	---	3	1	5	---	---	2	111	---
South Carolina	2	---	3	56	2	3	1	1	2	---	1	---	7	5
Georgia	2	---	31	49	---	10	---	1	3	---	2	2	34	9
Florida	1	1	2	173	---	10	4	---	3	---	---	5	8	1

EAST SOUTH CENTRAL														
Kentucky	1		2	262		14			8			3	19	21
Tennessee	4	1	27	104	1		1		14			4	29	3
Alabama	2		2	41	5	18	1		4			2	64	5
Mississippi	1		7	38	2	36	3		7		1	1	18	3
WEST SOUTH CENTRAL														
Arkansas			46	58		11			2		4	3	65	
Louisiana	3		3	23	2	42	4		6			5		2
Oklahoma			25	53	4	25	3	1	4		1	1	22	
Texas	15		670	792	3	219	39		17		5	4	321	
MOUNTAIN														
Montana	4		4	56					7		1		6	
Idaho			10	136			1		2				18	
Wyoming				24								1	1	
Colorado			5	240	1	13	1	1	8				12	
New Mexico	1		7	34		22	1		3				15	
Arizona	1		90	69		9	5		7		2		29	
Utah				358		3			4		1		16	
Nevada				1		1								
PACIFIC														
Washington	1		3	102	3	1			28			1	66	
Oregon			16	13	1	28	1		16				70	
California	1		5	724	3	19	9		90			24	188	1
Total	67	12	1,259	15,066	62	1,236	193	12	1,139		18	77	2,872	126
Median, 1945-49	175	9	871	19,834	67		77	15	1,811	4	2	75	1,914	
Year to date, 21 weeks	2,762	274	[4] 239,475	207,235	1,912	49,588	1,884	54	34,509	21	421	[illegible]	55,847	3,214
Median, 1945-49	5,392	177	133,138	419,563	1,827		914	65	52,672	151	88	[illegible]	45,471	
Seasonal low week ends	(27th) July 9		(30th) July 30	(35th) Sept 3	(37th) Sept. 17		(11th) Mar. 18		(32d) Aug. 13	(35th) Sept. 3		(11th) Mar. 18	(39th) Oct. 1	
Since seasonal low week	7,033		[5] 270,008	226,365	2,825		750		50,948	41		520	77,383	
Median, 1944-45 through 1948-49	12,958		176,696	454,509	2,799		421		79,353	185		607	74,439	

---

[1] Including cases reported as salmonellosis.

[2] New York City only.

[3] Including cases reported as streptococcal sore throat.

[4] Including delayed reports not assignable to a specific week.

[5] Excluding 40,000 cases estimated by county health officers to have occurred in Kentucky during the period Jan. 1 to Apr. 8, 1950, and 4,000 cases estimated to have occurred in Jones County, Iowa.

Anthrax: Connecticut and New Jersey, 1 case each.

Alaska: Pneumonia 3.

Hawaii: Influenza 1, measles 1, pneumonia 1, poliomyelitis 1, whooping cough 1.

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended May 13, 1950.—Cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis					2	5					7
Chickenpox			9	1	157	263	11	18	53	111	623
Diphtheria					1	1					2
Dysentery, bacillary						1					1
Encephalitis, infectious						2		1			3
German measles			40		22	1,104	2	109	143	366	1,786
Influenza			11			3	3			25	42
Measles			1	1	682	564	31	31	45	193	1,548
Meningitis, meningococcal				1	1	2					4
Mumps			54		187	456	3	85	93	240	1,118
Poliomyelitis						1				1	2
Scarlet fever	3		2		67	31	4	8	55	30	200
Tuberculosis (all forms)	4		3	20	80	19	14	7	9	40	196
Typhoid and paratyphoid fever			1		9	2				2	14
Venereal diseases:											
Gonorrhea	17		13	4	47	48	14	11	29	54	237
Syphilis	4		7	6	66	26	3	10	4	8	134
Whooping cough	1		13	1	65	90			3	57	230

NEW ZEALAND

Notifiable diseases—4 weeks ended March 25, 1950, and 5 weeks ended April 29, 1950.—Certain notifiable diseases were reported in New Zealand as follows:

Disease	4 weeks ended Mar. 25, 1950		5 weeks ended Apr. 29, 1950	
	Cases	Deaths	Cases	Deaths
Actinomycosis			1	
Brucellosis	1		3	
Diphtheria	7		11	
Dysentery:				
Amebic	2		3	
Bacillary	26	1	43	1
Encephalitis, lethargic			3	1
Erysipelas	8		9	
Food poisoning	258		62	
Hookworm disease	1			
Malaria	1			
Meningitis, meningococcal	11		15	3
Poliomyelitis	22		10	
Puerperal fever	2		2	
Scarlet fever	88		145	
Tetanus	3	2	5	6
Trachoma			1	
Tuberculosis (all forms)	150	46	219	53
Typhoid fever	11		17	3

JAPAN

Notifiable diseases—4 weeks ended March 25, 1950, and accumulated totals for the year to date.—Certain notifiable diseases were reported in Japan as follows:

Disease	4 weeks ended Mar. 25, 1950		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Diarrhea, infectious			10	
Diphtheria	1,120	134	3,581	395
Dysentery, unspecified	406	91	1,024	251
Filariasis	5		26	
Influenza	4,076		15,219	
Leprosy	56		116	
Malaria	50	5	138	16
Measles	5,835		13,201	
Meningitis, meningococcal	99	19	274	61
Paratyphoid fever	61	3	201	8
Pneumonia	20,251		59,321	
Poliomyelitis	117		364	
Puerperal infection	69		211	
Rabies	3		16	
Scarlet fever	277	1	968	5
Schistosomiasis	35		72	
Smallpox	1		3	
Tetanus	121		325	
Trachoma	10,197		26,360	
Tuberculosis	31,726		88,569	
Typhoid fever	205	28	702	110
Typhus fever	176	14	671	43
Venereal diseases:				
Gonorrhea	12,789		36,907	
Syphilis	11,076		30,172	
Whooping cough	9,605		31,188	

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Pakistan. During the week ended May 6, 1950, 5 fatal cases of cholera were reported in Chittagong, and 9 cases (all fatal) were reported during the week ended May 13. Four cases, with one death, were reported in Dacca during the week ended May 6.

Plague

Indochina (French). Plague has been reported in French Indochina as follows: Week ended May 6, 1950, 5 cases (3 deaths) in the Giadinh area, Cochinchina; week ended May 13, 5 cases in the port of Phanthiet, Annam.

Indonesia—Java.—In Jogjakarta, 9 fatal cases of plague were reported during the week ended April 29, 1950, and 11 fatal cases during the week ended May 6.

Smallpox

Republic of Korea.—During the month of February 1950, 453 cases of smallpox, with 83 deaths, were reported in Korea, and 506 cases (78 deaths) were reported during March.

Typhus Fever

Republic of Korea.—Typhus fever has been reported in Korea as follows: For the month of February 1950, 299 cases, 21 deaths; for March 1950, 428 cases, 36 deaths. During April, 49 cases were reported in the city of Seoul.

Yellow Fever

Peru—On February 16, 1950, one fatal case of yellow fever was reported in Juanjui, San Martin Department.

DEATHS DURING WEEK ENDED MAY 27, 1950

	Week ended May 27, 1950	Corresponding week, 1949
Data for 94 large cities of the United States:		
Total deaths	9,133	9,008
Median for 3 prior years	9,008	
Total deaths, first 21 weeks of year	204,564	202,313
Deaths under 1 year of age	616	661
Median for 3 prior years	675	
Deaths under 1 year of age, first 21 weeks of year	13,065	13,731
Data from industrial insurance companies:		
Policies in force	69,796,561	70,393,900
Number of death claims	13,122	13,287
Death claims per 1,000 policies in force, annual rate	9.8	9.8
Death claims per 1,000 policies, first 21 weeks of year, annual rate	10.0	9.7

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

VOLUME 65 JUNE 23, 1950 NUMBER 25

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FEDERAL SECURITY AGENCY

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INCIDENCE OF DISEASE

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Public Health Reports

Vol. 65 • JUNE 23, 1950 • *No. 25*

Public Health and the Aging

By Joseph W. Mountin, M. D.[*]

Traditionally, the beginning of a new century or a new half-century is a time for taking stock, for assessing past achievements, and for determining what our needs will be in the future. In the field of health and welfare, the middle of the twentieth century finds few factors more significant than this: for our country this is an era of an aging population. The increasing proportion of older people today undoubtedly presents the Nation with one of its foremost problems in the conservation of human resources.

It does not demand extraordinary vision to predict that few things will more profoundly affect the direction and emphasis of public health programs in the future than the progressive aging of our population. Answering the question of what can be done for and about the aging calls for considerable reflection, however. The problems of the aging are about as complex and varied as any in the entire field of human relations. Aging represents an economic, social, educational, and financial, as well as a health and medical problem, or at least an adjustment in each of these areas.

Nonetheless, I contend that health holds the key to the problems of making the years of later life happier and more productive for the individual and more useful to society. Once health agencies turn their attention to the normal health problems of aging—or what might be termed the hygiene of aging—and the prevention and stabilization of the chronic diseases, an important beginning will have been made. If, at the same time, the older people begin to find and accept their rightful place in society, then the solution of this "problem" is not far at hand.

There are some who might ask: "Why all this sudden interest in the aging? We have always had older people in our midst and they've always been more or less taken care of." The answers are not hard to find; they are written in the demographic history of this country. If we go back to the year 1900, for example, we find that it was a time of youth—the median age was just under 23 years. Today, however, the median age is just over 30 and in 1975 it is expected to be 34.

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[*] Assistant Surgeon General, Public Health Service, Associate Chief, Bureau of State Services. This paper was delivered at the Second Annual Citizens Health Conference of the Kentucky Public Health Association, Louisville, Ky., March 7, 1950.

Even more striking are the proportionate shifts toward the older ages. Less than one-fifth of the population was 45 years or older in 1900, but by 1960 almost one-third probably will have attained that age. Those who are generally lumped together in the old-age bracket, the group 65 years or over, constituted about 4 percent of the total in 1900. This group has now almost doubled, and 10 years from now almost 10 percent of the population is likely to be 65 years or over.

A number of factors have contributed to the rising age trend such as the decrease in immigration and the declining birth rate. Most important, however, has been the success of public health and allied agencies in substantially curbing the communicable diseases that took such heavy tolls in the last century. Because of better health in childhood and youth and because of better community sanitation more people are living longer. Thus, they are subject to the degenerative diseases prevalent among the older groups and to the stresses and deteriorations which are part of the aging process.

As a people, we have not given much thought to the problems of the aging because we never had to. Industry had enough young men to man the machines; those who were too old or unable to work were cared for by their families. We in the health fields were too busy building community sanitation facilities and fighting the infectious diseases to give much thought to the health problems of adults.

But the health of the aging group in the population, like the health of mothers and children, is in considerable measure a community and therefore a public health responsibility. If we accept the basic premise that the greatest asset of a Nation is its people, then ignoring the health and social needs of the 11,000,000 people who are 65 or over comes close to being criminally negligent. Aside from all humanitarian considerations, however, society has a very real stake in insuring that as many of this group as possible remain productive and independent. Otherwise, there will remain a group of people who are not only nonproductive but who are dependent on others for their livelihood and care. The effects on our ability to produce and on our standard of living cannot be anything but harmful.

There is another purely economic factor which must be considered in relation to the aging. Society has the right to expect a full measure of return from the investment, in terms of training and education, it puts into its citizens. This is impossible if older people are shunted out of industry, are permitted to fall victims of disability and chronic disease, and are forced out of productive employment because of hiring prejudices or arbitrary retirement ages.

We are now in a position with regard to the aging, it seems to me, that is similar in many ways to the child health movement of the beginning of this century. Over 50 years ago public health workers, as well as numerous professional and voluntary groups, began to study intensively the child and his needs. Begun with the aim of reducing the major childhood diseases and impairments to health, these studies were logically extended to include the "whole child"—his growth and development, his behavior, his emotional problems, and his relationship to his family, school, and community. Out of these studies came concrete proposals for changes and adjustments in attitudes, facilities, and services for the child. The result is our present body of knowledge and active programs for advancing child health and for improving the entire period of childhood.

Somewhat the same type of approach is now needed for the mature and older members of the community. As yet, most of the efforts for improving adult health have been directed toward the prevention and control of the chronic diseases. This is all to the good, for the chronic diseases deteriorate organs, destroy tissues, and aggravate the normal process of aging. It is encouraging to note that more and more public and voluntary health agencies are developing aggressive chronic disease programs.

On the other hand, our attention must be turned increasingly to the hygiene of aging. This calls for developing techniques and programs which will sustain productivity, maintain health, and meet the basic emotional and social needs of the aging group in the population.

This kind of approach will demand considerable research—basic, clinical, and social—but at the same time it will call for putting all our present knowledge to work on a mass basis.

In speaking of the health needs of the aging, it is easy to fall into two errors. One is to stigmatize and segregate the aging, endow them with special rights and privileges, and set them up as a group apart. This is not only harmful to them as individuals but also disruptive of our social and familial patterns.

The other danger is to consider aging as synonymous with disease. Aging is not a disease. It is not a state of ill-health. Actually, we grow old from birth—indeed, even before birth.

There are, in fact, several different kinds of aging, and one of the sources of difficulty is that these develop at different rates among various occupational groups, and even in the same individual. I will mention only three—chronological, physiological, and psychological aging. By the latter I mean not only the individual's mental and emotional maturation and decline but the acceptance of the older person by the community.

We can dismiss chronological aging at once, because we could no more "prevent" that type of aging than we could stop the earth in its orbit. Moreover, chronological aging—the mere ticking off of birthdays—is probably the least important of the three in fixing the "true" age of an individual.

Physiological aging is much more complex, because it implies a mixture of growth and decline that is going on in the same individual at one time. For example, physical decline begins to set in somewhere in the middle 20's but intellectual growth continues for some time thereafter. There are other compensations for biological aging, some internal, such as an increase in skill and judgment when speed of reaction lowers, and some man-made, such as the machine which takes the place of purely physical effort.

It is obvious, too, that physiological as well as psychological age differs markedly in various individuals with the same chronological age. How many of us "youngsters" have envied the buoyancy and vigor of a George Bernard Shaw and a Bernard Baruch? One of the lessons from this for health agencies is that health services will have to focus attention on the individual and on individual needs in dealing with the aging, while at the same time seeking to develop and apply more general measures to groups.

The public health approach to the problems of aging may be said to consist of four essential phases: (1) the hygiene of aging which includes not only the normal health requirements of the aging group with respect to diet, rest, recreation, etc., but the knowledge of how best to prepare for the period of aging; (2) the prevention or early finding and stabilization of the chronic diseases and impairments which accelerate the aging process; (3) rehabilitation and retraining which will enable the older person to make the adjustments required because of the exigencies of his age; and (4) education which must break down prejudices against older people and bring about widespread changes in attitudes by the employers, by the community, and by the older person himself.

Although there are many gaps in our knowledge of the aging process and although health work with the aging demands much individualized effort, the hygiene of aging implies certain common denominators which permit the application of mass measures. This would include measures directed toward preserving the physical vigor and work potential of older persons by husbanding physical resources, preventing disability and disease, and pushing back the period of true senility and complete dependency as far as possible.

Adults must be made aware of the necessity not only to preserve but to use fully all their physical resources, thus preventing atrophy and premature decay. Coupled with that must come the recognition that physical capacities at 60 are far different than they are at 20. The acceptance and practice of good health habits throughout the entire period of adult life should decrease the hazards of later maturity.

The physical, mental, and emotional preparation for later life must begin in youth and not in middle and old age when habits are firmly established or disability has already occurred. For instance, the promotion of good dental hygiene, such as limiting the consumption of sweets, and the widespread application of preventive measures early in life, such as sodium fluoride, would, according to present knowledge, mean loss of fewer teeth and better dental health in later life.

Accidents, especially late in life, are apt to result in some permanent disability. Among older people accidents occur very often in the home. Practically all accidents are man-made and therefore, in theory at least, preventable. Accident prevention must be taught in youth if it is to be practiced in maturity.

Obesity is associated with the increased incidence of hypertension, diabetes, heart disease, and even arthritis. Control of overweight—not simply in old age but throughout the whole of adult life—might not only help prevent some of the more important chronic diseases but should make the period of maturity longer and happier.

The second part of a public health program for the aging involves the control and stabilization of chronic illness. An individual who retains all his faculties and all his functions can make a much better adjustment to the aging process than one who acquires some type of disability. While a great deal is still unknown about the chronic diseases, techniques have now been developed which allow for their early detection and for the prevention of crippling complications. Mass examinations for tuberculosis and syphilis have proved valuable and economical and have pointed the way for broader programs.

The technique of multiple screening, wherein individuals are rapidly tested for the presence of several specific diseases, holds out the promise of early case-finding and prompt detection of many conditions which might go unchecked and thereby contribute to impairments in old age. In about 30 minutes an individual at a multiple screening clinic can be given a chest X-ray, blood tests, urinalysis, blood pressure determination, measurement of height and weight, and tests of vision and hearing. Tuberculosis, other diseases of the lungs, syphilis, diabetes, anemia, high blood pressure, obesity, and sight and hearing defects can thus be "screened" out for definitive diagnosis and corrective treatment. Many of the technical and administrative details of multiple screening have yet to be perfected. However, when multiple screening methods are organized and functioning smoothly, health agencies will be in a position to detect and place under control many adults who need preventive services, treatment, and rehabilitation.

All of these techniques not only make possible the rapid examination of large numbers of apparently well individuals but they may serve to stimulate people to arrange for more complete individual examinations. Periodic appraisals or regular check-ups are probably the most valuable procedures of all in looking for danger spots and guarding against break-downs. Public health agencies might well look toward the establishment and staffing of diagnostic centers which would assist the work of personal physicians in assuring the completeness of periodic health inventories. Even if the diseases found in this process could not be completely cured, early detection would enable the individual to make the necessary adjustments with regard to employment, diet, exercise, and his general regimen of life.

Rehabilitation and retraining are among the most important, albeit largely undeveloped, techniques in a program for dealing with the needs of the aging. Even when a chronic disease is not detected early, rehabilitation can mean a return to active, productive work by the sufferer. In some instances, restorative services will enable invalids to care for their own needs, thus freeing other persons from the burden of their care.

But retraining has even broader and more basic implications for the aging group in the population. Even if they have no disabilities, older people will have to modify normal activities and make the adjustment needed to meet depleted reserves of used up organs and tissues. Training for new and perhaps less strenuous types of work should begin well in advance of the ages when occupational changes may be desirable or necessary. Industry has a tremendous opportunity to retain the loyalty and experience of its older workers through a process of retraining and gradual change-over to jobs that will suit individual ages and capabilities. Beyond that, public health agencies will have to work with rehabilitation agencies, welfare and social groups, and educational institutions to make retraining for middle-aged workers more widespread, more individualized, and more beneficial to the community. Self-employed persons and workers in smaller establishments especially need help from community sources.

Basic to an improvement in the status of older people is a sustained public educational campaign to establish the older person's rightful place in society. This involves attitudes and prejudices, and a host of economic and social factors which are perhaps outside the direct responsibility of health agencies. Nevertheless, health agencies might point the way and exert their influence in teaching people to accept the period of aging and learn to live with it. There must be a recognition that people at all ages have a positive contribution to make to society. The accumulated wisdom and experience of the mature citizen can provide the proper balance for the enthusiasm and energy of the younger citizen.

America has traditionally been termed the land of youth and opportunity. The accent has been on youth and rightly so in a Nation that needed young men to push back its frontiers and build a civilization out of forests and wilderness. However, this kind of thinking has resulted in unfortunate attitudes which have seeped into our national consciousness.

We tend to put a premium on youth and to scrap a tremendous portion of our human resources. We accept too readily such arbitrary and unfounded ideas that older people are unfit because of their age and are subject to more work accidents and greater absenteeism. A few studies which have been made, in fact, tend to prove that the exact opposite is true that older workers have fewer accidents and spend less time away from their jobs. And while it is true that more specific measurements of the work capacities and abilities of older people are needed, it is also true that there are few jobs for which the mature citizen cannot be trained or conditioned.

The widespread feelings of prejudice toward older workers by employers and by the community engenders in older workers themselves a feeling of inadequacy. Thus, they accept an inferior status, which leads to physical stagnation and emotional breakdown, and ultimately to economic drain on the community. When older people begin to play a more active role, both on their jobs and in their communities, much of their physical and emotional anguish will disappear.

In stressing activity, I do not mean to ignore or belittle the need for retirement. There are some, for example, who will wish to retire from active work while still vigorous. If their economic circumstances permit, they should, of course, do so. Most of these persons desire some outlet in hobbies, civic affairs, or other pursuits less exacting than their normal occupation. For others, a system of gradual or partial retirement with some supplementation of income through pensions or insurance payments might be the answer to their needs. And finally, there will be those who are totally incapacitated for all gainful employment or participation in social affairs. These people need custodial care under circumstances most nearly approaching normal family life. This, perhaps, is not public health but it is good social practice.

As yet there are few established patterns of programs for the hygiene of aging. But States and localities can begin to survey their own problems in relation to that objective. They should determine the local resources available for meeting the problems and begin to formulate programs appropriate to their needs and resources.

Some States have already begun to take limited action in this field. For example, such widely separated States as Indiana and

California have set up divisions of adult health and geriatrics in their health departments to formulate and carry out programs for dealing with the aging. A legislative committee in New York State has recommended that a state-wide agency be established to deal with the aging, drawing from the resources and facilities of almost all the existing State agencies. Massachusetts and Maryland are pointing the way in programs for chronic disease control.

It is obvious that programs for meeting the varied problems of the aging will call for a complete mobilization of community resources. Many agencies will have to work together—health, welfare, housing, recreation, employment—if the needs of the aging are to be met effectively. For the immediate present, existing staffs can be utilized. Over the years, however, new competencies will have to be developed to direct and carry on the programs which are bound to evolve for older people.

The first half of the twentieth century can rightfully be termed the age of the child. Without diminishing our efforts to make the period of childhood healthier and happier we should, in the second half of the twentieth century, attempt to equal those efforts for adults. During this half century we should increasingly direct our thoughts and energies to make the period of maturity more useful and beneficial. I can think of few more lasting contributions to our Nation's ultimate health and welfare.

Studies of Coxsackie Virus

Adaptation of a Strain to Chick Embryos

By R. J. Huebner, M. D., Sara E. Ransom, M. S., and E. A. Beeman, M. D.*

Coxsackie viruses are characterized by limited host ranges among laboratory animals (*1*, *2*). The purpose of this note is to report the adaptation of one type of Coxsackie virus to chick embryos and the cultivation of virus through 10 egg passages.

Materials and Methods

A virus isolated in September 1949 from the feces of an ill person during a study of an outbreak of mild febrile illness (*3*) was employed in this study. This virus which produced paralysis and death in suckling mice was representative of a group of similar viruses isolated from each of 8 persons who were ill during the outbreak. It appeared to be immunologically identical with, and in all other ascertainable respects similar to, Dalldorf's type 2 strain isolated in 1947 from a patient in Wilmington, Del. (*4*). When 3- to 4-day old mice were used for titrations, mouse-brain suspensions of this virus gave ID_{50}[1] titers of 10^{-3} to 10^{-4}, while muscle suspensions gave ID_{50} titers of 10^{-6} to 10^{-7}. There was usually close agreement between ID_{50} and LD_{50} endpoints. Mice over 2 weeks of age showed no signs of illness when injected with potent virus.

The series of passages reported in this manuscript were initiated with a pool of mouse brains from the fifth mouse passage following primary isolation from human feces. Egg passages were made in fertile New Hampshire Red and white Leghorn eggs which had been incubated 7 days. Suckling albino mice (NIH strain) 3 to 4 days of age were employed for mouse passages and titrations of viruses. Older mice were used for preparation of antiserum. Sterile distilled water was used for suspending all egg and mouse materials. Specimens were emulsified by grinding with alundum in hand blender or a mortar. All suspensions from egg and mouse materials were tested for bacterial contaminants in fluid thioglycolate media incubated at 37° C. and were observed for 7 days.

Techniques of Injection and Harvesting

Fertile eggs were injected into the allantoic or yolk-sac cavities with 0.5 cc. of the specified inoculum and incubated at 35° C. Various post-inoculation periods of incubation were employed. However, in each instance, during 10 successful consecutive passages of virus, the eggs were incubated 6 days before harvesting.

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[1] 50 percent endpoint based on paralysis.

The various specified embryo fluids and tissues were harvested; suspensions were immediately prepared, cultured, and then frozen at −45° C. until used in further studies. Only those suspensions shown to be free of bacterial contamination were employed as inoculums for eggs or mice.

Methods for Demonstrating Virus in Egg Materials

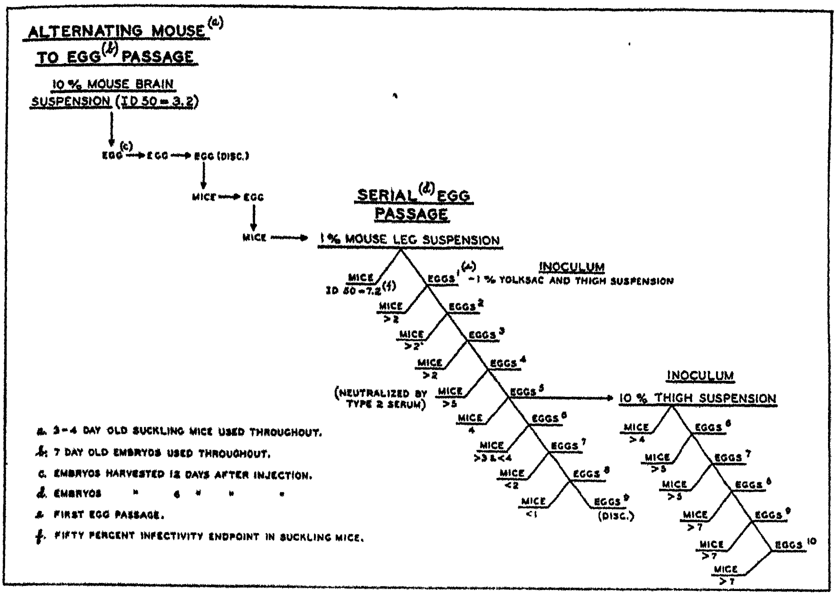
Embryo tissues and fluids from each egg passage were injected into 3- to 4-day old suckling mice. Typical paralysis within 6 or 7 days was accepted as evidence of virus. When virus appeared abundant, titrations using tenfold dilutions were performed in suckling mice in order to determine approximate endpoints. Suspensions of embryo tissues were also titrated in eggs, following which pools of embryo tissues representing the various dilutions were tested in the usual manner in mice for the presence of virus.

Results

Early attempts at egg passage were discouraging. Fertile eggs which were injected in the allantoic cavity with infected mouse brain ($ID_{50}=3.2$) and harvested at 4, 9, and 12 days after injection could not be shown to contain virus in any tissues or fluids beyond second passage. Similarly, virus could no longer be demonstrated beyond third yolk-sac passage even when embryo thigh muscles which contained most demonstrable virus were used as inoculum. However, there appeared to be some indication of propagation in the latter series of passages.

At this point an alternating passage technique (*5*) was tried using embryo tissue from the third yolk-sac passage described above to produce illness in suckling mice. Following a mouse-to-egg-to-mouse passage (chart) consecutive yolk-sac passages were again initiated with a leg suspension ($ID_{50}=7.2$) from a paralyzed mouse. Virus was successfully propagated in embryos harvested 6 days after injection in this series of egg passages as shown in the chart. It will be noted that the virus content of embryo thigh tissues increased during the last 4 passages when 10 percent thigh-tissue suspensions were used as inoculum. This is in contrast to a parallel series of passages in which 1 percent suspensions of mixed yolk sac and thigh tissues were used as inoculum, and which resulted in a progressive loss of virus during subsequent passages.

Egg-propagated virus was identified following fifth, seventh, eighth, and ninth passages by means of neutralization tests using antiserum prepared in adult mice (*3*) against Dalldorf's type 2 virus, homologous mouse passage virus, heterologous strains of virus, and



Schematic presentation of a series of yolk-sac passages resulting in the adaptation of Coxsackie virus (type 2) to chick embryos, showing 50 percent infectivity titers of embryonic tissues from successive passages when titrated in suckling mice.

normal mouse tissue. Maximal amounts (100–10,000 ID_{50}) of virus employed in the tests were neutralized by Dalldorf's type 2 serum and by the homologous serum but not by heterologous or normal serums.

Early studies showed that virus was present in larger quantities in embryo tissue than in allantoic and yolk-sac fluids or membranes. These observations were confirmed in later experiments when parallel titrations of pooled portions of embryos also showed that thigh muscles contained more virus than viscera or brain tissue. A suspension made from bodies of embryos (without heads) from tenth passage was found to have an ID_{50} titer of approximately 10^{-7} in mice.

The chart shows that the use of a 1 percent yolk-sac and thigh-tissue suspension as standard inoculum for serial egg passages finally resulted in the loss of virus. When it became apparent in sixth passage that the virus content was diminishing progressively, a titration of inoculum from fifth passage was performed in eggs using tenfold dilutions of chick-embryo thigh tissue. It was found that a 10-percent thigh suspension produced more virus in the chick-embryo tissues than higher dilutions. From this experiment it appeared that more concentrated inoculums were necessary to maintain virus growth in chick embryos. This indeed proved to be the case (chart).

During the 10 successive passages in eggs, death rates among infected embryos prior to harvesting did not appear to exceed those expected among normal embryos. In one experiment, however, embryos injected with a 10-percent suspension of thigh tissue (eighth passage; $ID_{50}=5.0$) were not harvested but allowed to proceed to the hatching stage. Four of six embryos survived 21 days but were poorly developed and failed to hatch.

An attempt to establish yolk-sac adapted virus in serial allantoic passage was unsuccessful. A 10-percent thigh-tissue suspension from fifth-passage yolk sac was used to initiate a series of passages via the allantoic fluid. Although virus was demonstrable in embryo thigh muscles and allantoic fluid for three subsequent egg passages, no virus could be demonstrated following fourth passage.

Summary and Conclusion

Following the use of an alternating mouse-to-egg passage technique, a Coxsackie virus similar to Dalldorf's type 2 was propagated in 10 consecutive yolk-sac passages. Despite the fact that inoculums were injected into the yolk-sac cavity, nearly all demonstrable virus was found localized in embryo tissue. After 10 passages, chick-embryo tissues when diluted 10^{-7} produced paralysis and death in mice, which appeared in all visible respects similar to the effects produced by mouse tissue infected with the parent virus.

After five, seven, eight, and nine passages the egg-propagated virus was neutralized in a specific manner by antiserum against Dalldorf's type 2 and homologous mouse-passage virus.

It cannot be concluded from one series of experiments that the alternating mouse-to-egg-passage technique was responsible for the successful adaptation of Coxsackie virus to fertile hen eggs. However, the evidence is consistent with such an hypothesis and justifies additional similar attempts with the same or different strains of virus.

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Medical Examination and Vaccination of Farm Laborers Recruited from Mexico

By Ralph Gregg, M. D.*

The Division of Foreign Quarantine is responsible for preventing the introduction of quarantinable diseases into the United States and for preventing the entry of aliens afflicted with serious mental and physical conditions excludable under the immigration laws. An important activity of the Division in connection with these responsibilities is the medical examination of laborers at the Mexican border. This work is carried out as part of a cooperative procedure involving the United States Employment Service, the Immigration and Naturalization Service, the Public Health Service, and the National Government of Mexico.

For many years Mexican laborers have been admitted into the United States for limited periods to work on farms, particularly in the Southwest where large numbers of hand laborers are needed to harvest vegetable crops. To a less extent Mexican labor has been recruited for railroad work.

Before World War II little attention was paid to the health of the workers brought in. However, when the United States Government became concerned with the labor supply from the standpoint of the war effort, medical examinations and vaccinations were instituted in connection with the recruitment procedures.

During the war the Public Health Service sent physicians and mobile chest X-ray units into Mexico to conduct the examinations. Applicants were rejected when found to be afflicted with so-called "class A" conditions causing exclusion under the immigration laws. These conditions include insanity, feeble-mindedness, epilepsy, and other serious mental defects; tuberculosis; venereal diseases; trachoma; and a large group of contagious diseases not common in the United States. Besides class A conditions, other physical conditions that might make a man unfit for physical labor were causes for rejection.

All laborers examined were vaccinated against smallpox in accordance with the Public Health Service foreign quarantine regulations, in order to prevent introduction of this disease.

Since the war, the examinations have been performed in Mexico by Mexican physicians. Their work has been supervised by the medical officer in charge of United States Public Health Service quarantine on

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Braceros being vaccinated against smallpox by Public Health Service personnel.

the Mexican border, assisted by his staff at El Paso, Tex., and by medical officers at the border quarantine stations under his direction, such as Brownsville, Eagle Pass, and Laredo, Tex., and Nogales, Ariz.

In 1949, as in other recent years, recruitment and examination of Mexican laborers was done in the fall. A departure in 1949 consisted in examining workers in both the United States and Mexico. In the United States, the procedures were carried out at El Paso, Crystal City, and Harlingen, Tex., and in Mexico, at Chihuahua and Hermosillo. While procedures in Mexico followed the usual pattern, the purpose in the United States was to legalize, temporarily, the status of many workers who had already entered the country illegally.

In Mexico, examinations, including use of the stethoscope for the heart and lungs, were made of all workers by Mexican doctors furnished by the local health departments. At the time of examination, all workers were vaccinated against smallpox. Chest X-rays for tuberculosis were not made in 1949, as the examination procedure had of necessity been set up on very short notice. The labor contract agreements with Mexico were made late in the harvest season and the examination of workers was initiated under emergency conditions that did not permit the use of photofluorographic X-ray equipment. In some instances as many as 1,000 persons per day were examined at rural points near large pools of labor. Rejections were made for all class A conditions encountered, for communicable diseases, and diseases and physical defects that would obviously interfere with satisfactory performance of work or that might require prolonged treatment in the United States. On arrival at the border ports of entry all accepted workers, together with their baggage, were dusted with DDT powder by Service personnel to prevent introduction of typhus fever.

Because there was an insufficient number of doctors at the three centers in the United States, inspections of workers were made by sanitary inspectors under the supervision of a doctor at each place. All personnel required were taken from the quarantine stations at El Paso, Laredo, Hidalgo, and Brownsville. As was the case in Mexico, all workers were vaccinated against smallpox, but physicians examined the heart and lungs only when they thought it necessary. Also, the DDT dusting of workers was not routine but was carried out only when inspection revealed the need for it. Rejections were made for the same causes as for workers recruited in Mexico.

The following table gives the number of laborers examined and vaccinated, the number rejected, and causes for rejection, for the year ending June 30, 1949.

Medical examinations of alien laborers, fiscal year 1949

Where examined	*Number examined*	*Number rejected*	*Number vaccinated*
Mexico	19,013	561	19,013
United States	80,020	1,042	80,020
Total	99,033	1,603	99,033

Causes for rejections	*Mexico*	*United States*	*Total*
Mental conditions	2	2	4
Eye disease or defect	93	333	426
Skin disease	29	58	87
Heart disease or defect	13	0	13
Pulmonary condition	10	5	15
Toxic goiter or other thyroid condition	13	0	13
Teeth, severe pyorrhea or caries	143	19	162
Generalized lymphadenopathy (glands, neck, groin, etc.)	10	11	21
Hemorrhoids and varicose veins	65	23	88
Urethral discharge	14	142	156
Venereal ulcers (includes penile ulcer, mucous patches, and genital and inguinal scars of less than 2 years' duration)	38	96	134
Hernia (all forms)	95	230	325
Contracture, fixed joints, etc	8	55	63
Absence of arms, legs, hands, fingers, etc. (one thumb and two fingers will pass if individual otherwise normal)	4	26	30
Fevers (any unexplained elevation above 100° F.)	2	8	10
All other causes	22	34	56
Total	561	1,042	1,603

Sickness Absenteeism Among Industrial Workers, Third and Fourth Quarters of 1949

By W. M. Gafafer, D Sc.*

The accompanying data on 8-day or longer disabilities experienced by male employees during the third and fourth quarters of 1949 are derived from periodic reports submitted by industrial sick benefit associations, company relief departments, and group health insurance plans. The reports cover approximately 200,000 male workers in various industries

The third and fourth quarter rates for 1949 for sickness and nonindustrial injuries are 9 and 13 percent, respectively, below the corresponding rates for 1948; the corresponding decreases for the respiratory group of diseases are 23 and 20 percent. The third and fourth quarter respiratory rates of 1949 are the lowest recorded for the 10 years, 1940–49; the third quarter rate of 15.4 is 36 percent below the 10-year third quarter mean rate of 24.0 while the rate of 23.0 for the fourth quarter is 48 percent below the 10-year fourth quarter mean of 44.6. Both quarters of 1949 show lower rates for influenza and grippe than the corresponding quarters of 1948; the third quarter rate of 2.7 for 1949 and the fourth quarter rate of 6.3 for the same year are the lowest rates recorded for the corresponding quarters of the 10 years 1940–49, the two rates being 58 and 65 percent, respectively, below the 10-year mean rates of 6 4 and 18.2.

Both the third and fourth quarter rates of 1949 for all sickness and nonindustrial injuries, 80.1 and 79.8, respectively, continue the decline from the maximum rates of 120.1 and 157.6 recorded for the third and fourth quarters of 1945. The excesses in the frequency of disability recorded during the war period are particularly notable when it is recalled that the present experience is based on absences of 8 days or longer generally certified by a physician. In evaluating time changes in absenteeism rates consideration must be given to the possible effect on recorded disabilities of a complex of factors affecting the worker, and his home and industrial environment. Any conclusions derivable from the increase in sickness frequency during the war years and the drop in rates beginning in 1946 can be made only with information on such factors as the composition of the exposed population with respect to age, physical fitness, and general work experience during the prewar, war, and postwar periods.

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*From Division of Industrial Hygiene, Public Health Service. The report for first and second quarters of 1949, and for year 1948 appeared in Pub Health Rep 64: 1350–1352 (1949) Reprint No 2974.

Number of absences per 1,000 males (annual basis) on account of sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer, by cause; experience of male employees in various industries, third and fourth quarters of 1949 [1]

Cause [2]	Number of absences per 1,000 males (annual basis) beginning in specified period						
	Fourth quarter		Third quarter		Year		
	1949	1948	1949	1948	1949	1948	1944–48
Sickness and nonindustrial injuries	79.8	91.8	80.1	88.1	93.1	102.0	123.8
Nonindustrial injuries (169–195)	10.2	11.0	11.4	12.5	10.9	12.2	12.3
Sickness	69.6	80.8	68.7	75.6	82.2	89.8	111.5
Respiratory diseases	23.0	28.8	15.4	20.0	26.1	31.8	44.8
Tuberculosis of respiratory system (13)	.7	.4	.5	.8	.6	.6	.7
Influenza, grippe (33)	6.3	8.2	2.7	4.9	7.6	10.2	17.4
Bronchitis, acute and chronic (106)	3.9	5.5	2.7	3.9	4.3	5.8	7.5
Pneumonia, all forms (107–109)	3.9	4.3	2.5	2.3	3.9	4.3	4.8
Diseases of pharynx and tonsils (115b, 115c)	2.1	3.5	2.6	2.6	3.3	3.5	4.7
Other respiratory diseases (104, 105, 110–114)	6.1	6.9	4.4	5.5	6.4	7.4	9.7
Digestive diseases	14.0	16.5	15.6	15.7	16.4	16.6	18.0
Diseases of stomach except cancer (117, 118)	4.9	6.1	4.5	5.1	5.2	5.6	6.0
Diarrhea and enteritis (120)	1.4	2.1	2.2	2.6	2.0	2.1	2.4
Appendicitis (121)	2.6	3.4	3.5	3.5	3.5	3.4	3.8
Hernia (122a)	2.3	1.8	2.8	1.9	2.6	2.4	2.4
Other digestive diseases (115a, 115d, 116, 122b–129)	2.8	3.1	2.6	2.6	3.1	3.1	3.4
Nonrespiratory-nondigestive diseases	29.9	33.3	35.5	37.2	37.3	38.3	44.1
Infectious and parasitic diseases (1–12, 14–24, 26–29, 31, 32, 34–44) [3]	1.3	1.8	1.8	2.2	2.2	2.7	2.7
Rheumatism, acute and chronic (58, 59)	2.9	3.3	3.3	3.4	3.8	4.1	5.2
Neurasthenia and the like (part of 84d)	1.2	1.5	1.0	1.6	1.6	1.6	2.1
Neuralgia, neuritis, sciatica (87b)	1.5	2.2	2.0	2.1	2.0	2.4	3.0
Other diseases of nervous system (80–85, 87, except part of 84d, and 87b)	1.5	1.2	1.7	1.8	1.7	1.5	1.9
Diseases of heart and arteries, and nephritis (90–99, 102, 130–132)	5.4	6.0	6.2	5.9	6.5	6.6	7.4
Other diseases of genitourinary system (133–138)	3.1	2.9	3.1	3.2	3.2	3.1	3.3
Diseases of skin (151–153)	2.4	3.1	3.2	3.7	3.0	3.3	3.6
Diseases of organs of movement except diseases of joints (156b)	1.8	2.3	2.3	2.6	2.4	2.8	3.4
All other diseases (45–57, 60–79, 88, 89, 100, 101, 103, 154, 155, 156a, 157, 162)	8.8	9.0	10.9	10.7	10.9	10.2	11.5
Ill-defined and unknown causes (200)	2.7	2.2	2.2	2.7	2.4	3.1	4.6
Average number of males	187,245	203,231	192,840	203,564	195,059	200,901	1,048,177

[1] Industrial injuries and venereal diseases are not included.
[2] Numbers in parentheses are disease title numbers from International List of Causes of Death, 1939.
[3] Exclusive of influenza and grippe, respiratory tuberculosis, and venereal diseases.

—Announcement—

Ten Openings for Physicians Under Displaced Persons Act

Approximately 10 physicians will be needed on and after July 1, 1950, to supervise and participate in the medical examination of about 200,000 persons under the provisions of the Displaced Persons Act. This act considerably expands the area in which the work has been conducted during the past 2 years. Special training in psychiatry and tuberculosis are desirable but not considered essential. The assignment will be for a period of approximately 1 year. The work will be conducted in the following countries: Germany, Austria, England, Italy, Greece, and the Philippine Islands.

There also is a continuing need for physicians for assignment to the American Consulates in Europe as medical advisers in the regular immigration work. The medical screening of aliens is considered a significant contribution to the broad public health programs for the control of tuberculosis, venereal diseases, and mental health. The established period for this duty is 2 years.

Applicants who are not already medical officers of the Public Health Service and who meet the requirements for appointment in the Reserve Corps of the Public Health Service will receive reserve commissions. Special foreign service allowances are provided varying from $4 to $12 per day, depending on the cost of living in the various cities. No special foreign allowances are paid in Germany and Austria as in these countries, quarters, commissary, post exchange, and clothing store privileges are available through the Army.

Overseas transportation in most cases probably will be by air. During a tour of duty, there is generally an opportunity to take vacation trips and, if desired, work at more than one station.

Physicians without dependents are preferred. Any physician interested in a foreign assignment should immediately so indicate by telegram or letter addressed to R. C. Williams, Assistant Surgeon General, Chief, Bureau of Medical Services, U. S. Public Health Service, Federal Security Agency, Washington 25, D. C.

June 23, 1950

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JUNE 3, 1950

Reported cases of influenza in the Nation increased from 1,259 to 1,590 for the current week over the preceding week. The rise was due to a reported increase in Virginia of 378 cases, from 183 to 561. South Carolina reported an increase from 3 cases last week to 22 cases, and West Virginia reported a decrease from 35 to 16 cases. The cumulative number of cases of influenza for the first 22 weeks of the year was 241,068 which may be compared with the corresponding totals of 71,644 for 1949 and 296,940 for 1947, the highest on record for the past 5 years. The corresponding 5-year (1945–49) median was 133,962.

A decrease from the preceding week was noted in the reported incidence of whooping cough, from 2,852 to 2,484 for the current

Comparative Data for Cases of Specified Reportable Diseases

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended		5-year median 1945–49	Seasonal low week	Cumulative total since seasonal low week		5-year median 1944–45 through 1948–49	Cumulative total for calendar year		5-year median 1945–49
	June 3, 1950	June 4, 1949			1949–50	1948–49		1950	1949	
Anthrax (062)	------	------	(1)	(1)	(1)	(1)	(1)	18	26	(1)
Diphtheria (055)	75	117	165	27th	7,088	[2] 8,445	13,123	2,817	[2] 3,331	5,557
Acute infectious encephalitis (082).	9	17	9	(1)	(1)	(1)	(1)	283	217	193
Influenza (480–483)	1,590	923	923	30th	271,598	107,914	177,520	241,068	71,644	133,962
Measles (085)	13,061	17,967	17,967	35th	239,426	571,694	478,392	220,296	519,301	443,446
Meningococcal meningitis (057.0).	72	56	58	37th	2,898	[2] 2,626	2,854	1,985	[2] 1,782	1,882
Pneumonia (490–493)	1,163	1,224	------	(1)	(1)	(1)	------	50,732	[2] 46,107	------
Acute poliomyelitis (080)	132	156	144	11th	881	[3] 800	565	2,015	[3] 1,775	1,032
Rocky Mountain spotted fever (104).	23	19	23	(1)	(1)	(1)	(1)	77	123	88
Scarlet fever (050)	1,015	1,116	1,522	32d	51,963	75,549	80,871	35,524	53,005	54,185
Smallpox (084)	1	------	3	35th	42	52	188	22	42	134
Tularemia (059)	13	32	25	(1)	(1)	(1)	(1)	434	530	413
Typhoid and paratyphoid fever [4] (040, 041).	84	52	61	11th	604	552	666	1,114	[3] 1,040	1,139
Whooping cough (056)	2,484	1,046	2,079	39th	79,886	[2] 32,509	76,130	58,350	22,476	44,864

[1] Not computed.
[2] Changed by corrected report from Indiana for week ended April 29.
[3] Deduction: North Carolina, week ended April 1, 1 case.
[4] Including cases reported as salmonellosis.

week. The 5-year median was 2,079. The cumulative total for the first 22 weeks of the year was 58,350 as compared with the corresponding total of 22,476 for the same period last year; and 44,864 for the 5-year median.

The total number of acute poliomyelitis cases reported for the current week was 132 as compared with 103 last week. The corresponding figure last year was 156 and the 5-year (1945–49) median was 144. Included in the total of 132 cases were 55 from Texas, 18 from California, and 12 from Oklahoma.

Reported cases of meningococcal meningitis numbered 72 for the week as compared with 62 cases last week, and a 5-year median of 58. The total for the week included 9 cases in Pennsylvania, 6 in Michigan, 6 in Tennessee, and 7 in Texas.

The reported incidence of typhoid and paratyphoid fever increased from 75 the preceding week to 84. The 5-year median was 61. The cumulative total for 22 weeks of this year was 1,114 cases of typhoid and paratyphoid fever.

For this week in the Nation the following cases were reported: Diphtheria 75, infectious encephalitis 9, measles 13,061, Rocky Mountain spotted fever 23, scarlet fever 1,015, smallpox 1, and tularemia 13.

DEATHS DURING WEEK ENDED JUNE 3, 1950

	Week ended June 3, 1950	Corresponding week, 1949
Data for 94 large cities of the United States		
Total deaths	8,797	8,731
Median for 3 prior years	8,731	
Total deaths, first 22 weeks of year	213,361	211,044
Deaths under 1 year of age	597	611
Median for 3 prior years	661	
Deaths under 1 year of age, first 22 weeks of year	13,662	14,342
Data from industrial insurance companies		
Policies in force	69,787,204	70,806,235
Number of death claims	10,595	10,152
Death claims per 1,000 policies in force, annual rate	7.9	7.5
Death claims per 1,000 policies, first 22 weeks of year, annual rate	9.9	9.6

Reported Cases of Selected Communicable Diseases: United States, Week Ended June 3, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	75	9	1,590	13,061	72	1,163	132
New England	5	1	4	914	2	27	----------
Maine	----------	----------	3	17	----------	5	----------
New Hampshire	----------	----------	----------	2	----------	----------	----------
Vermont	----------	----------	----------	9	----------	----------	----------
Massachusetts	5	1	----------	695	2	----------	----------
Rhode Island	----------	----------	1	5	----------	4	----------
Connecticut	----------	----------	----------	186	----------	18	----------
Middle Atlantic	8	1	3	3,931	14	246	8
New York	1	1	[1] 2	1,482	4	166	5
New Jersey	1	----------	1	1,390	1	23	3
Pennsylvania	6	----------	----------	1,059	9	57	----------
East North Central	5	4	27	4,366	14	194	8
Ohio	3	----------	1	678	4	31	5
Indiana	1	----------	----------	473	----------	10	----------
Illinois	1	2	2	1,233	2	91	1
Michigan	----------	2	6	1,111	6	55	2
Wisconsin	----------	----------	18	871	2	7	----------
West North Central	3	----------	22	722	9	83	4
Minnesota	----------	----------	9	248	2	10	1
Iowa	----------	----------	----------	117	----------	1	2
Missouri	1	----------	1	78	3	16	----------
North Dakota	----------	----------	6	3	----------	44	----------
South Dakota	----------	----------	----------	22	1	----------	1
Nebraska	1	----------	5	155	----------	3	----------
Kansas	1	----------	1	99	3	9	----------
South Atlantic	10	----------	633	641	9	170	10
Delaware	----------	----------	----------	7	----------	----------	----------
Maryland	4	----------	4	47	2	34	----------
District of Columbia	----------	----------	1	35	----------	15	----------
Virginia	----------	----------	561	200	2	70	----------
West Virginia	1	----------	16	73	----------	10	----------
North Carolina	2	----------	----------	76	3	----------	2
South Carolina	----------	----------	22	59	----------	13	1
Georgia	1	----------	26	35	----------	19	----------
Florida	2	----------	3	109	2	9	7
East South Central	17	----------	39	361	9	58	6
Kentucky	4	----------	3	120	2	8	----------
Tennessee	5	----------	14	141	6	----------	1
Alabama	4	----------	18	78	1	36	1
Mississippi	4	----------	4	22	----------	14	4
West South Central	18	----------	726	785	10	289	69
Arkansas	1	----------	55	70	1	17	1
Louisiana	----------	----------	----------	18	----------	16	1
Oklahoma	1	----------	27	15	2	21	12
Texas	16	----------	644	682	7	235	55
Mountain	5	----------	114	643	2	63	5
Montana	----------	----------	6	33	1	----------	----------
Idaho	----------	----------	54	135	----------	----------	----------
Wyoming	----------	----------	----------	15	----------	----------	1
Colorado	3	----------	1	180	1	32	1
New Mexico	2	----------	3	18	----------	12	2
Arizona	----------	----------	49	36	----------	16	1
Utah	----------	----------	1	226	----------	3	----------
Nevada	----------	----------	----------	----------	----------	----------	----------
Pacific	4	3	22	698	3	33	22
Washington	----------	----------	----------	78	----------	----------	1
Oregon	----------	----------	18	9	----------	11	3
California	4	3	4	611	3	22	18
Alaska	1	----------	1	----------	----------	10	----------
Hawaii	----------	----------	1	2	----------	----------	3

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[1] New York City only.

Reported Cases of Selected Communicable Diseases: United States, Week Ended June 3, 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Smallpox (084)	Tularemia (059)	Typhoid and paratyphoid fever [1] (040, 041)	Whooping cough (056)	Rabies in animals
United States	23	1,015	1	13	84	2,484	126
New England		142			10	338	
Maine		6				58	
New Hampshire		3				2	
Vermont		1				30	
Massachusetts		104			9	138	
Rhode Island		2			1	55	
Connecticut		26				55	
Middle Atlantic		232			10	313	15
New York		[2] 114			4	109	15
New Jersey		29				98	
Pennsylvania		89			6	106	
East North Central	3	320			4	555	10
Ohio		101			1	160	4
Indiana	2	32				53	
Illinois		36			2	77	2
Michigan	1	111			1	167	3
Wisconsin		40				98	1
West North Central		35		1	11	106	2
Minnesota		7				36	
Iowa						10	2
Missouri		5		1	11	33	
North Dakota		6					
South Dakota							
Nebraska		13					
Kansas		4				27	
South Atlantic	9	68		2	9	307	26
Delaware		2				8	
Maryland	5	12		1		26	
District of Columbia	1	4				1	
Virginia	1	19			1	135	5
West Virginia	1	5			2	24	8
North Carolina	1	11				53	
South Carolina		1			3	13	4
Georgia		5		1	2	41	9
Florida		9			1	6	
East South Central	3	24			2	128	23
Kentucky	1	8			1	40	11
Tennessee		9			1	43	4
Alabama	1	5				34	6
Mississippi	1	2				2	2
West South Central		33		9	13	402	43
Arkansas		1		7	1	60	2
Louisiana					2	1	
Oklahoma		6				15	4
Texas		26		2	10	326	37
Mountain	4	44	1	1		145	2
Montana	2	7				12	
Idaho		3				26	
Wyoming		1		1		1	
Colorado	2	24	1			51	2
New Mexico		2				17	
Arizona		4				35	
Utah		3				3	
Nevada							
Pacific	4	117			25	190	5
Washington		19			1	44	
Oregon	4	12			1	37	
California		86			23	109	5
Alaska						2	
Hawaii							

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[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.

PLAGUE INFECTION IN TEXAS COUNTY, OKLA.

Under date of June 2, 1950, plague infection was reported proved in a specimen of 37 fleas, *Thrassis fotus*, from 5 grasshopper mice, *Onychomys leucogaster*, trapped May 18, 1950, in Texas County, Okla., about 27 miles northwest of Guymon on United States Highway No. 64, then 7 miles north on a county road to Elkhart, Kans.

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended May 20, 1950.—Cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis					3	1					4
Chickenpox			3		175	186	6	16	61	42	489
Diphtheria					2			1			3
Dysentery, bacillary						1					1
Encephalitis, infectious						2					2
German measles			39		26	1,694		123	201	221	2,304
Influenza			53			8	3				64
Measles			20	40	602	828	46	34	25	116	1,801
Meningitis, meningococcal				2		1		1			4
Mumps			83	48	145	429	7	58	79	147	996
Poliomyelitis						1				1	2
Scarlet fever	3		4	2	79	22	4	6	38	3	161
Tuberculosis (all forms)	23		1	14	59	31	17	6		33	184
Typhoid and paratyphoid fever					4			1		2	7
Venereal diseases:											
Gonorrhea	9		7	7	98	57	11	8	26	56	279
Syphilis	2		6	8	53	15	7	8	4	18	121
Other forms							1				1
Whooping cough	1		7	1	123	53	1	1	1	54	242

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—During the week ended May 20, 1950, 422 cases of cholera, with 236 deaths, were reported in Calcutta. Three hundred and eight cases were reported during the week ended May 27. Reported cases in other cities in India for the week ended May 20 are as follows: Allahabad 3, Ahmedabad 3 (all fatal), Lucknow 3.

Pakistan—During the week ended May 20, 1950, 29 cases of cholera, with 8 deaths, were reported in Chittagong.

Plague

Indochina (*French*)—During the week ended May 20, 1950, plague was reported in French Indochina as follows: In rural areas of Kampot, Cambodia, 34 cases, 8 deaths; in the port of Phanthiet, Annam, 6 cases, 2 deaths.

Smallpox

French West Africa—During the period May 1–10, 1950, 105 cases of smallpox were reported in Niger Territory.

Gold Coast—Eighteen cases of smallpox (2 deaths) were reported during the period May 6–15, 1950.

Indonesia—Java—The incidence of smallpox in Surabaya rose from 21 cases reported for the week ended March 4, to 103 cases for the week ended April 22. For the week ended April 29, 94 cases were reported.

Typhus Fever

Spain—During the week ended April 22, 1950, four cases of typhus fever were reported (one in Madrid and three in Segovia).

Yellow Fever

Gold Coast—During the week ended March 25, 1950, three suspected cases of yellow fever were reported in Akwatia, Oda Area.

Peru—On May 2, 1950, one death from yellow fever was reported in Lamas, San Martin Department.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

VOLUME 65 JUNE 30, 1950 NUMBER 26

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Salmonella duval

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
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Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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INCIDENCE OF DISEASE

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Public Health Reports

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Statistical Studies of Heart Disease

VII. Mortality from Eight Specific Forms of Heart Disease Among White Persons

By Mary Gover, D. Sc. Hyg., and Maryland Y. Pennell, M. Sc. Hyg.*

The 1938 revision of the International List of Causes of Death (*1*) showed a total of 20 heart disease rubrics, an increase of 7 over the 1929 revision. Each subdivision of heart disease based on the tissue affected was subdivided on the basis of the rheumatic origin of the specific form of heart disease, in order to establish subordinate classification groups of deaths certified as due to the after effects of rheumatic fever. The deaths thus tabulated ir the "other chronic rheumatic heart disease" group represent about 2 percent of the total number of heart disease deaths (exclusive of a few tabulated as chronic rheumatic endocarditis and included under chronic valvular disease in table 1). These deaths added to the 11 percent tabulated as due to chronic affections of the valves and endocardium approximate a classification group of all reported chronic rheumatic heart disease, but some deaths of nonrheumatic origin are included.

In addition to this change in 1938, four terms were reallocated from "other diseases of the heart" to "chronic myocarditis," namely, cardiovascular disease, hypertensive heart disease, abscess of heart, and rupture of heart. The transfer involved 54,584 deaths in 1940 (*2*), or nearly half of the deaths formerly tabulated as due to other diseases of the heart and one-quarter of the deaths tabulated in 1940 as due to diseases of the myocardium. The chronic myocarditis group also was increased by 10,812 deaths reallocated from "other diseases of the myocardium" as tabulated under the 1929 revision.

A further classification change in 1938 transferred certain heart disease rubrics to various other causes of death resulting in a loss of 11,519 deaths formerly classified as due to heart disease (*2*). A large proportion of these deaths (9,166) had been certified as due to cardiac nephritis, cardionephritis, or cardiorenal disease, and were transferred from "other diseases of the heart" to "chronic nephritis."

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*Biostatisticians, Division of Public Health Methods, Public Health Service. Dr. Gover died in August 1949. This series of papers dealing with the statistics of heart morbidity and mortality is the result of a joint study undertaken by the Division of Public Health Methods and the National Office of Vital Statistics and is now being financed in part by the National Heart Institute.

Details of the several reclassifications are presented in a special report of the National Office of Vital Statistics (*2*). Table 1 as shown here is adapted from that report and gives the numbers of deaths in 1940 tabulated by both the 1929 and 1938 revisions of the International List. The classification group, diseases of the heart (all forms), was reduced only 3 percent through transfers of deaths to other main groups. Changes within the main classification groups, however, were of major importance numerically and, as has been stated, affected principally other diseases of the heart and chronic myocarditis.

In the sixth revision of the International List in 1948, which provides a single list applicable to both morbidity and mortality statis-

Table 1. *Deaths from heart disease in 1940 tabulated according to both the 1929 and 1938 revisions of the International List of Causes of Death* [1]

International List titles, 1938 revision	List numbers, 1938 revision	Deaths in 1940 classified by		Reallocation in deaths between 2 revisions	Percent of heart disease deaths, 1938 revision	
		1929 revision	1938 revision		Based on all heart disease deaths	Based on five broad classification groups
Diseases of the heart (all forms)	90-95	396,710	385,191	−11,519	100.0	
Diseases of the coronary arteries and angina pectoris	94a, b	101,361	101,463	+ 102	26.4	100.0
Acute endocarditis (except rheumatic)	91a, b, c	2,797	2,830	+ 33	.7	100.0
Chronic affections of the valves and endocardium and other chronic rheumatic heart disease		51,875	51,691	− 184	13.4	100.0
Valvular disease and chronic endocarditis	92a, b, d	36,888	39,572	+ 2,684	10.3	71.1
Endocarditis (unspecified, 45 years and over)	92e	2,902	2,708	− 194	.7	5.6
Other chronic rheumatic heart disease	90a, 92c, 93c, 95b	12,085	9,411	− 2,674	2.4	23.3
Diseases of the myocardium		146,994	199,996	+ 53,002	51.9	100.0
Acute myocarditis (except rheumatic)	93a	4,168	4,152	− 16	1.1	2.8
Myocarditis (unspecified, under 45 years)	93b	744	725	− 19	.2	.5
Chronic myocarditis	93d	110,704	170,812	+60,108	45.9	75.3
Other myocarditis	93e	31,378	18,307	−13,071	4.7	21.4
Other diseases of the heart		93,683	29,211	−64,472	7.6	100.0
Pericarditis (except rheumatic)	90b	588	580	− 8	.1	2.0
Functional diseases of the heart	95a	959	1,021	+ 62	.3	3.5
Other diseases of the heart	95c	92,136	27,610	−64,526	7.2	94.5
Closely related diseases						
Syphilitic heart disease	30d, e	(2)	5,160			
Acute rheumatic fever	58	1,831	1,725			
Congenital heart disease	157e, f	(2)	6,354			

[1] See Vital Statistics Special Reports 19: 153–277 (1944).

[2] Not available.

ties (*3*), a total of 19 individual categories are defined for diseases of the heart under the following four main divisions: chronic rheumatic heart disease, arteriosclerotic and degenerative heart disease, hypertensive heart disease, and other diseases of the heart. Preliminary tabulations of deaths during the first part of 1949 show a net gain between the fifth and sixth revisions of about 10 percent in the total number of deaths tabulated as diseases of the heart (*4, 5*). However, the shifts within the main divisions are not available at the present time, and it must be kept in mind that the terminology used in this study on specific forms of heart disease is based on the fifth (1938) revision.

The Eight Specific Forms

The five main divisions of diseases of the heart as suggested by the National Office of Vital Statistics are used in table 1 rather than the six divisions of the International List. Diseases of the myocardium accounted for half of the total deaths from all forms of heart disease in 1940. In that group three out of four deaths were certified as chronic myocarditis. Diseases of the coronary arteries and angina pectoris ranked second, with one-fourth of the deaths. In third place, with 13 percent of the heart disease deaths, were those tabulated as due to chronic affections of the valves and endocardium and other chronic rheumatic heart disease. In this category 71 percent of the deaths were certified as a form of valvular disease. Other diseases of the heart accounted for only 8 percent of the heart deaths; in this group 95 percent of the deaths were certified as a rare, ill-defined, or unspecified form of heart disease, the majority being unspecified as to form. The fifth main division, with less than 1 percent of the total deaths, was acute endocarditis.

Three other groups of deaths are considered in this study, namely, syphilitic heart disease, acute rheumatic fever, and congenital heart disease. Each category is related broadly to diseases of the heart but not tabulated in that main classification group. The last two are important causes of heart mortality among both sexes in the younger ages; the first, among middle-aged males.

Although coding procedures are uniform for the entire country, there are known to be geographic differences in the relative frequency of reported multiple causes of death. Physicians in urban areas, such as predominate in the North, tend to report more multiple causes. Hence relatively more urban death certificates are referred to the Joint-Cause Manual in a selection of the primary (tabulated) cause of death. In rural areas one may expect a greater inaccuracy of reporting the primary cause of death, as well as the details of diagnosis. This would lead to an increase in recorded mortality from the subgroup, other diseases of the heart, as the size of the city decreases.

Male-Female Comparison

Seven of the eight specific forms of heart disease showed a higher mortality for men than for women. The age-adjusted death rates per 100,000 population for each category were as follows for white males and females in the United States in 1940.

	Male	*Female*	*Percent excess male over female*
Diseases of the myocardium	162.91	135.00	21
Diseases of the coronary arteries	111.93	46.54	141
Chronic affections of the valves and endocardium	39.50	34.81	13
Other diseases of the heart	25.01	15.71	59
Congenital heart disease	5.81	4.45	31
Syphilitic heart disease	4.29	1.08	297
Acute endocarditis	1.98	1.69	17
Acute rheumatic fever	1.15	1.19	−3

Mortality from syphilitic heart disease showed the greatest sex differential, as would be expected, with a rate for males nearly four times that for females. Death rates from diseases of the coronary arteries among males exceeded those among females by 141 percent. For other forms of heart disease the excess of male over female mortality was 59 percent or less. Acute rheumatic fever was the only form of heart disease mortality for which the male rate was lower than the female rate (fig. 1 and appendix table 1).

In urban areas of the United States the percentage excess of male over female heart disease mortality was markedly higher than in rural areas. The exceptions were valvular heart disease and congenital heart disease.

The age-specific death rates presented later in this study (fig. 5 and appendix table 2) illustrate the high male mortality at each age, particularly during the middle years of life. There was a slight tendency for the female rate to exceed the male rate during younger years; for example, for acute rheumatic fever at ages 5-14, for acute endocarditis up to age 25, and for valvular heart disease up to age 45. However, the other major forms showed much higher rates for males than for females throughout all ages.

Geographic Sections

Both urban and rural mortality recorded for all diseases of the heart is slightly higher in the North than in the South and in eastern than central sections of the United States. The broad regional distribution of industrialization, as measured by the percentage employed in manufacture, is in general similar to that of mortality from heart disease (*9*).

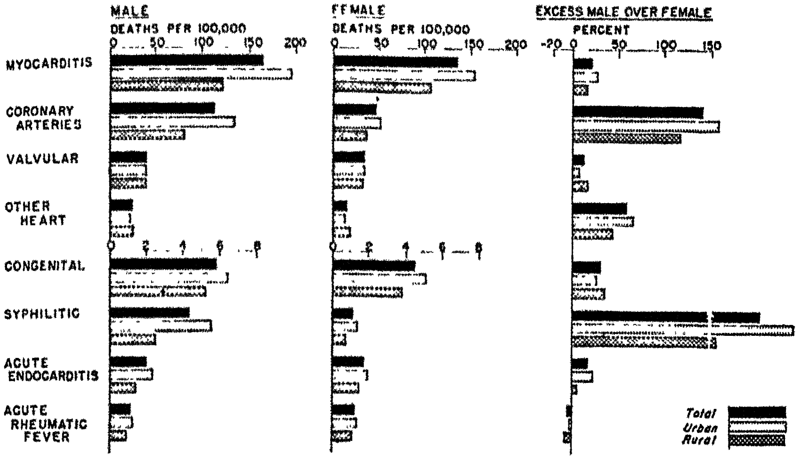

Figure 1. Male and female mortality from eight forms of heart disease and the percentage excess of male over female mortality, in urban and rural parts of the United States: white resident age-adjusted mortality in 1940.

Mortality rates for each of the specific forms of heart disease in nine geographic sections are given in the appendix table 1. The present discussion, however, will be limited to a North-South comparison in the eastern section of the United States, that is, the States east of the Mississippi River. The New England, Middle Atlantic, and East North Central regions have been combined to form the North; the South Atlantic and East South Central regions, the South. These two regions accounted for 69 percent of the total white population in the United States in 1940.[1]

Mortality from all but one of the specific forms of heart disease is higher in the North than in the South sections of the eastern United States, whether we consider the rates for males or for females (fig. 2 and appendix table 2). Mortality from diseases of the myocardium shows the greatest difference in rates, with the rates in the South being less than two-thirds as high as those in the North. This is the chief factor in the North-South relationship noted above for all forms of heart disease.

Mortality from the subgroup, other diseases of the heart, was the one form with consistently higher rates in the South than in the North. This is undoubtedly related to a progressive increase in recording of deaths without mention of a specific form of heart disease in the more rural areas as compared with large urban centers.

Among urban males several other specific forms of heart disease also showed higher mortality rates in the North than in the South.

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[1] The two West Central geographic sections comprised 20 percent of the white population; the Mountain and Pacific sections, 11 percent. Combined as the West, such a nonhomogeneous region does not lend itself to a North-South comparison that has meaning.

These included deaths from diseases of the coronary arteries, and to a lesser extent those from congenital heart disease and syphilitic heart disease. Only the first of these had a significant difference in rates and made a major contribution to the relatively high rates of mortality from all forms of heart disease observed for males in small cities of the South (*9*).

Population Size

Recorded mortality from diseases of the heart (all forms) is known to decline as size of city decreases, with clearly marked urban-rural differences. The extent of industrialization and related factors such as income and availability of medical facilities and services are correlated with heart disease mortality when size of city is held constant (*9*).

The major component, diseases of the myocardium, is shown in figure 1 as having a rural rate of only about two-thirds that of urban parts of the United States. The ratio of the rural to the urban death rates, expressed as a percentage, is given below for each of the specific forms of heart disease.

	Rural rate as percentage of urban rate	
	Male	*Female*
Diseases of the myocardium	62	69
Diseases of the coronary arteries	61	73
Chronic affections of the valves and endocardium	102	96
Other diseases of the heart	117	136
Congenital heart disease	82	79
Syphilitic heart disease	44	57
Acute endocarditis	64	74
Acute rheumatic fever	81	88

Similar differences between the urban and the rural rates are apparent in figure 2, where geographic section is held constant.

The steady decline in mortality from diseases of the myocardium with varying size-of-city groups may be seen in the following data from appendix table 1 for white males in the United States in 1940. There were 227 deaths from that cause per 100,000 population in the largest cities (those with 100,000 or more population), 171 in the middle-sized group (cities with 10,000–100,000 population), and 158 in the small cities (2,500–10,000 population). Thus the total urban rate was 196 deaths per 100,000 population as compared with a rural rate of only 122. Female rates followed this same pattern of decline as size of city decreased.

Deaths from diseases of the coronary arteries and from acute endocarditis showed similar differences between urban and rural rates. Recorded mortality was higher in cities of all sizes than in rural areas, but the decline among the cities was not always consistent with population size.

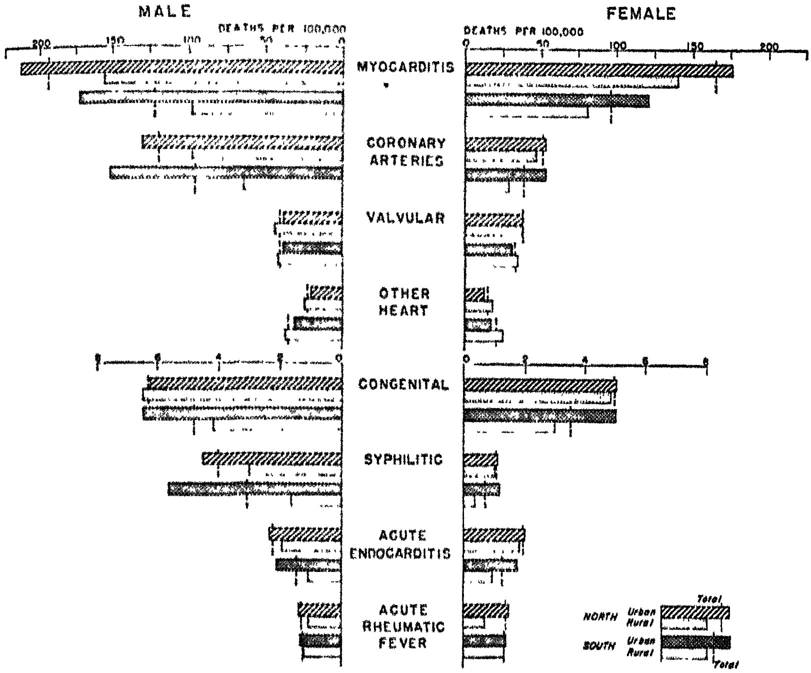

Figure 2. Male and female mortality from eight forms of heart disease in urban and rural parts of the North and South sections of the eastern United States: white resident age-adjusted mortality in 1940.

Valvular heart disease among males and other diseases of the heart among both sexes were the only specific forms that had recorded mortality rates higher in rural than in urban areas. The latter rate bore an inverse relationship to size of city, as discussed previously.

Variation With Age

There is considerable overlapping in the ages of high mortality of the several forms of heart disease, but within broad limits certain subgroups are associated with different age periods of the life span. Figures 3 and 4, based on appendix table 2, show by age the percentage distribution of heart disease deaths classified as due to each of the eight specific forms.

Congenital heart disease occurs mainly in persons under 5 years of age. In that age group it accounts for 91 percent of mortality from all forms of heart and closely related diseases. From 5 to 35 years of age, valvular heart disease is the major cause of heart disease mortality and is responsible for almost half of the deaths from all forms. From 35 to 65 years, mortality from diseases of the coronary arteries is a relatively large part of the total, as much as 44 percent among men.

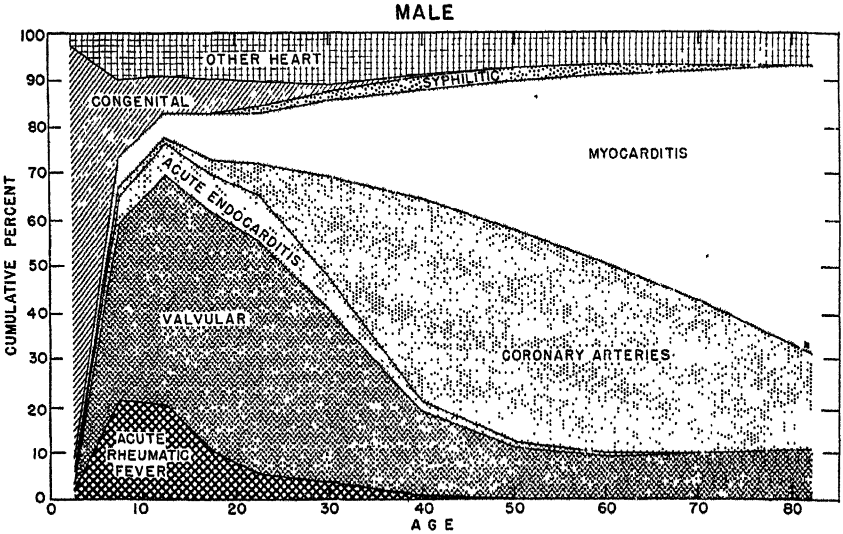

Figure 3. Proportion of heart disease deaths from each of eight forms among males by age group: white resident age-adjusted mortality in the United States, 1940.

At 65 years and over, diseases of the myocardium form the major portion of heart disease mortality—nearly two-thirds of the heart disease deaths among women.

Acute rheumatic fever appears as the second most important of these eight causes of heart disease mortality in the young ages, 5–19

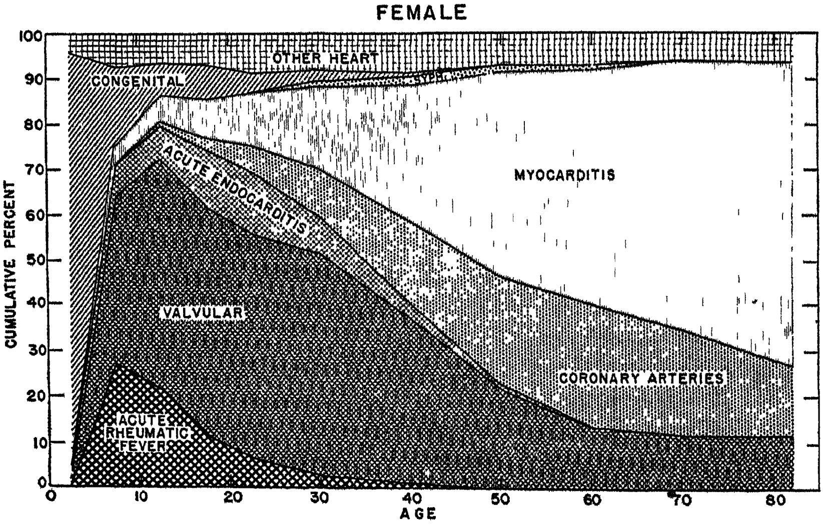

Figure 4. Proportion of heart disease deaths from each of eight forms among females by age group: white resident age-adjusted mortality in the United States, 1940.

years. Deaths from acute endocarditis are associated with young adulthood, and those from syphilitic heart disease, with the middle-adult ages.

In paper V of this series (*10*), it has been shown that the age-specific mortality curve for females for diseases of the heart (all forms) plots as a straight line on semilogarithmic paper from the ages of 30 to 80 years. The straightness of the line indicates that the

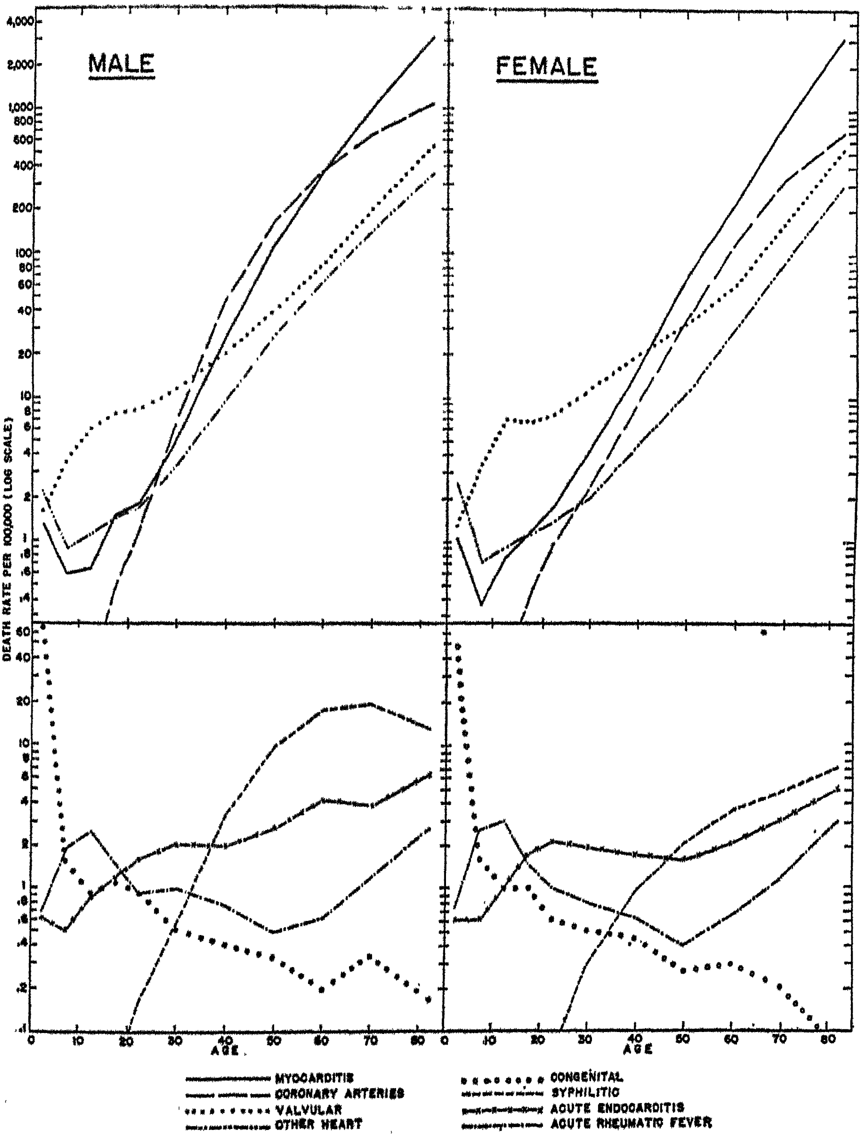

Figure 5. Age-specific mortality from eight forms of heart disease among white males and females in the United States, 1940.

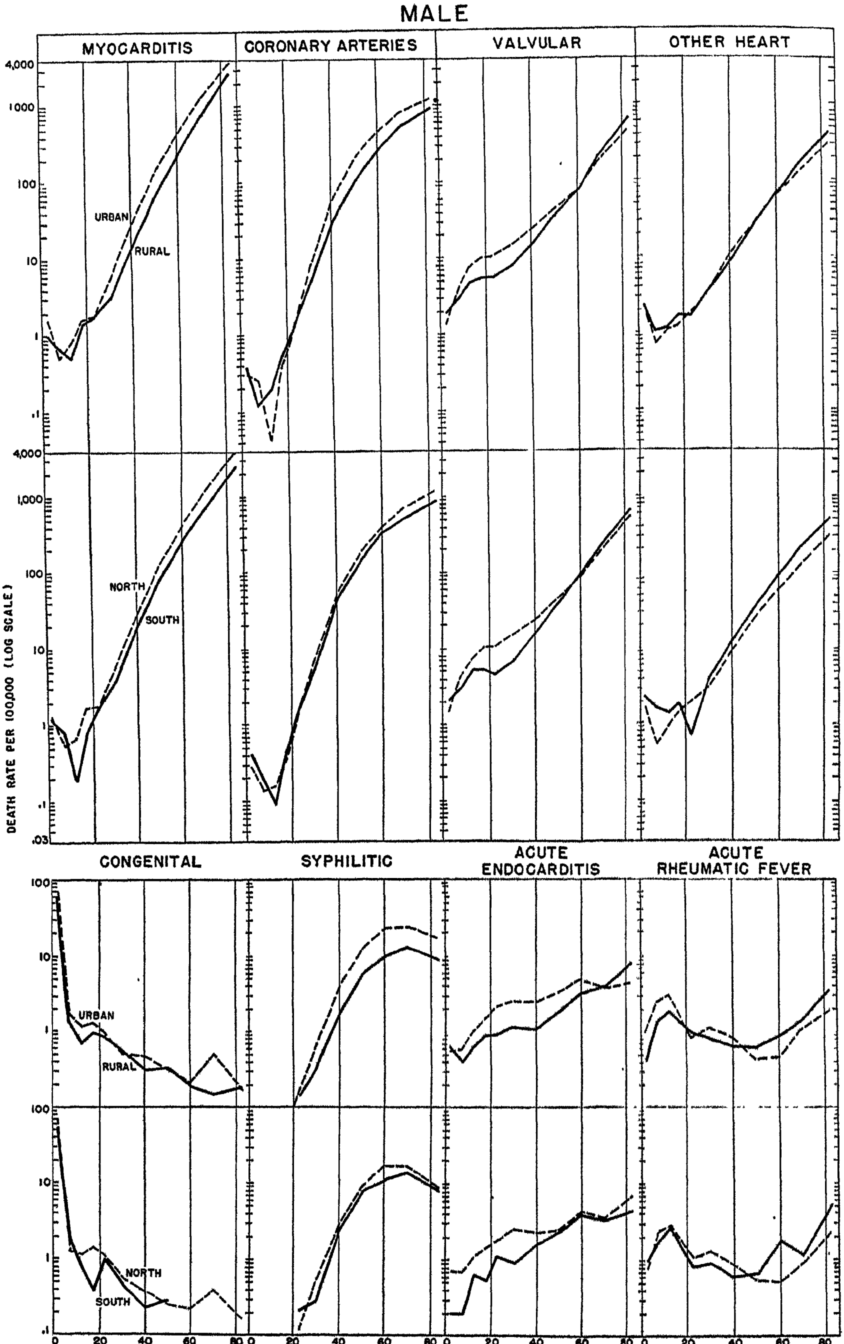

Figure 6. Age-specific male mortality from eight forms of heart disease in urban and rural parts of the United States and in North and South sections of the eastern United States: white resident mortality in 1940.

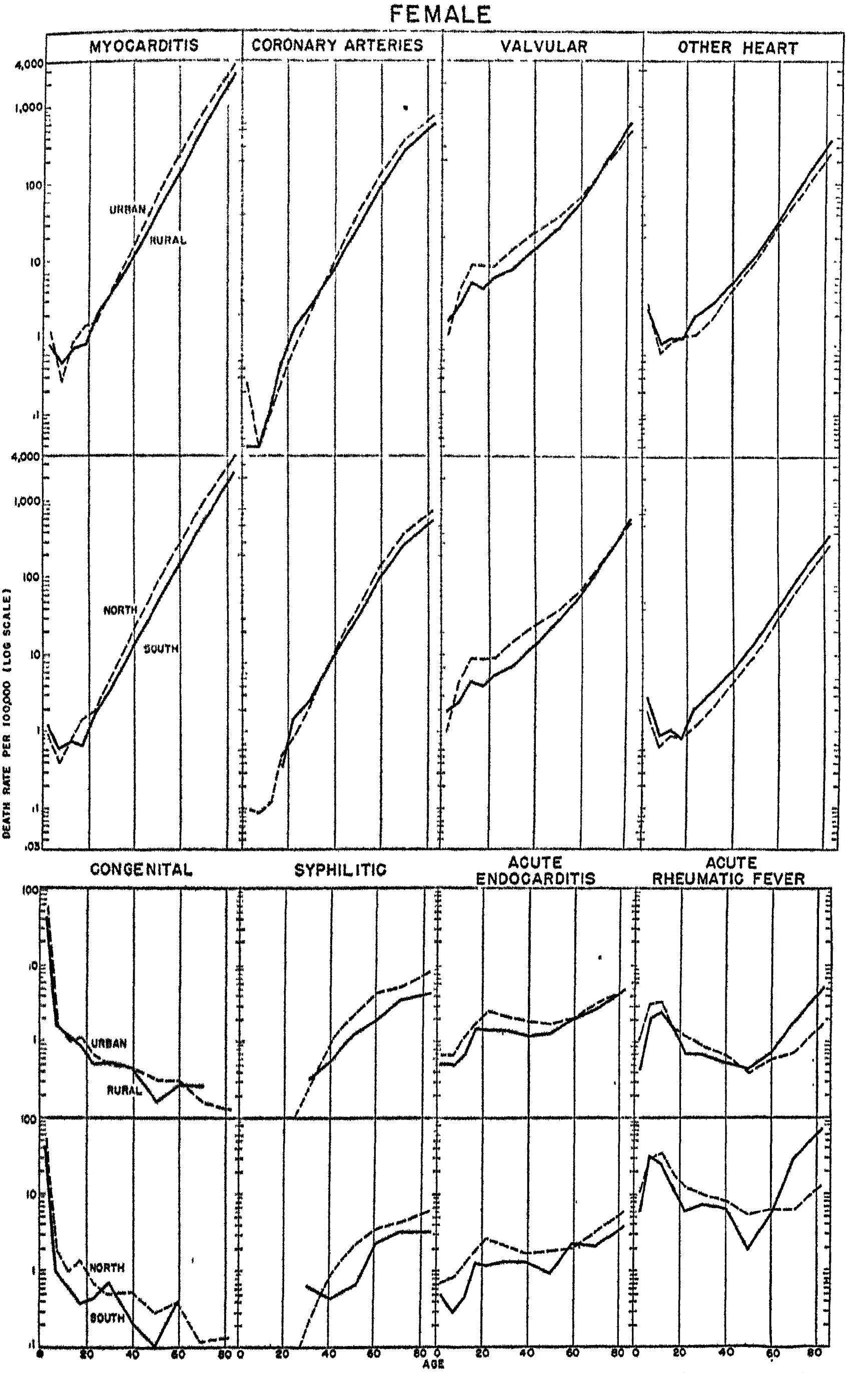

Figure 7. Age-specific female mortality from eight forms of heart disease in urban and rural parts of the United States and in North and South sections of the eastern United States: white resident mortality in 1940.

death rate increases at a constant percentage during this long age range. The corresponding curve for males rises more sharply during the adult years and then flattens off although it always keeps above the female rate.

The age-specific mortality curves for males and for females for each of the eight forms of heart disease are given on semilogarithmic grids in figure 5, based on appendix table 2. The four major forms illustrated in the top part of the figure show rapid increases with age from approximately 15 years onward. The curves for diseases of the coronary arteries bow upward throughout the adult ages but above age 60 the increase is at a much slower rate, especially for males. Deaths from diseases of the myocardium show a similar pattern, but the curves continue to rise at a faster rate than those for diseases of the coronary arteries. On the other hand, mortality from valvular heart disease has a plateau at ages 15–24 years, with acceleration in the rates throughout the balance of the life span. Beyond age 50, deaths from the subgroup, other diseases of the heart, show increased percentage changes for females but some retardation in the rise of the rates for males.

Acute endocarditis presents a curve of mortality that is different in shape from the four major forms of heart disease. Mortality from this cause is relatively high at ages 20–34 years, with only a slow increase in rates thereafter.

Deaths from acute rheumatic fever have their peak at ages 10–14 years. Then the mortality declines until age 50. After that it begins to increase, reaching the former peak level again in the oldest age groups.

The curve for congenital heart disease shows a rapid decline in mortality after its peak in the youngest age group. The curve for syphilitic heart disease mortality pictures the steady percentage increase for males during young adulthood, with some retardation during the older years of life.

Figures 6 and 7 illustrate for different age groups of males and females in the United States the urban-rural relationships discussed previously for all ages combined; the basic data are in appendix table 2. The higher urban rates at a specific period of life result in an age distribution that is younger in urban than in rural areas, particularly throughout the middle-adult years. This results in a lower mean age at death in cities.

The age-specific mortality curves for diseases of the myocardium, diseases of the coronary arteries, and syphilitic heart disease all show the urban rates as being higher than the rural rates at a given age during the middle and older years. The same pattern of higher urban mortality during the middle period of life is apparent for valvular heart disease and acute endocarditis, but there is a reversal during the older years, with higher rural than urban mortality. The reversal in the older age groups occurs also for acute rheumatic fever, although both that form and congenital heart disease show higher urban rates during the young ages. Deaths from the subgroup, other diseases of the heart, have higher rural rates at nearly every age as would be expected from the nature of the classification.

The age-specific mortality rates for the North and South sections of the United States east of the Mississippi River are also illustrated in figures 6 and 7. The marked similarity between the two sets of curves given in these figures is apparent with the North and urban rates higher than their corresponding South and rural rates for a specific-age group.

Data on the urban-rural rates for the North and South sections are given in appendix table 2. The mortality rates for the total North tend to fall between those of the urban North and the urban South. The total South mortality curves plot between those of the rural North and the rural South. Thus the North and South mortality rates are a function of the degree of rurality with the North curve weighted in favor of urban areas and the South curve, in favor of rural areas.

Summary

Broad groups of specific forms of mortality from heart and closely related diseases have been set up according to a classification of the National Office of Vital Statistics. The eight forms in order of their magnitude among white males and females in the United States in 1940 are: diseases of the myocardium, diseases of the coronary arteries, chronic affections of the valves and endocardium, other diseases of the heart, congenital heart disease, syphilitic heart disease, acute endocarditis, and acute rheumatic fever.

Seven of the eight forms of heart disease showed a higher mortality for men of all ages (adjusted) than for women, the exception being acute rheumatic fever. Mortality from all but the subgroup, other diseases of the heart, was higher in the North than in the South sections of the Eastern United States. Recorded mortality tended to be higher in urban than in rural areas. Some of the specific forms of heart disease showed a pattern of steady decline as size of city decreased.

The association of mortality from the eight forms of heart disease with certain periods of life is established in graphic form. Death from congenital heart disease occurs mainly under 5 years of age. The major cause of heart mortality from 5 to 35 years is valvular heart disease; from 35 to 65 years, diseases of the coronary arteries; and over 65 years, diseases of the myocardium. Acute rheumatic fever is in second position in the young ages, 5–19 years. Deaths from acute endocarditis are associated with young adulthood; those from syphilitic heart disease, with the middle-adult ages. Age-specific mortality rates in urban and rural parts of the United States and in North and South sections of the eastern United States are presented.

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Appendix Table 1. *Mortality from 8 specific forms of heart disease by sex, population size groups, and geographic section of the United States: white resident age-adjusted*[1] *mortality per 100,000 population in 1940*

Geographic section and size of city	Diseases of the coronary arteries		Acute endocarditis		Chronic affections of the valves and endocardium		Diseases of the myocardium		Other diseases of the heart		Acute rheumatic fever		Syphilitic heart disease		Congenital heart disease	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
United States	111.93	46.54	1.95	1.64	39.55	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4.45
100,000 and over	151.46	51.39	2.44	1.91	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10,000-100,000	139.79	55.28	2.29	1.74	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2,500-10,000	151.95	50.39	2.05	1.52	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Under 2,500 and rural	52.45	37.96	1.45	1.59	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
New England	142.15	58.13	2.35	1.99	41.47	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
100,000 and over	145.43	55.15	2.29	2.18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10,000-100,000	150.72	60.15	2.56	1.56	38.53	58.51	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2,500-10,000	158.45	58.85	2.06	1.46	43.74	35.73	[illegible]	[illegible]	[illegible]	[illegible]	1.11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Under 2,500 and rural	122.50	57.21	1.62	2.12	44.93	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4.01
Middle Atlantic	127.43	52.79	2.34	1.86	42.57	41.58	[illegible]	[illegible]	16.51	11.72	1.61	[illegible]	[illegible]	1.11	[illegible]	5.07
100,000 and over	132.18	54.01	2.11	1.59	39.81	43.00	[illegible]	[illegible]	12.69	8.70	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10,000-100,000	138.79	52.11	2.52	1.73	41.11	38.75	196.21	159.67	17.92	11.71	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2,500-10,000	132.69	54.72	2.64	3.04	39.11	36.06	193.00	153.42	20.49	13.47	2.01	[illegible]	[illegible]	.72	[illegible]	[illegible]
Under 2,500 and rural	107.55	50.30	2.41	2.02	[illegible]	42.34	[illegible]	[illegible]	21.75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5.25
East North Central	105.72	45.17	2.12	1.99	39.36	34.00	[illegible]	[illegible]	[illegible]	[illegible]	1.13	1.32	[illegible]	1.12	[illegible]	4.57
100,000 and over	112.57	46.52	2.63	2.46	35.12	33.69	[illegible]	[illegible]	[illegible]	[illegible]	1.61	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10,000-100,000	125.23	50.49	1.99	1.97	37.08	32.59	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.83	[illegible]	[illegible]
2,500-10,000	117.08	43.55	1.71	1.53	36.69	30.69	[illegible]	[illegible]	[illegible]	18.03	[illegible]	[illegible]	[illegible]	.45	7.24	4.74
Under 2,500 and rural	86.96	41.12	1.73	1.59	42.10	[illegible]	[illegible]	[illegible]	27.02	[illegible]	[illegible]	1.14	[illegible]	1.05	6.53	4.73
West North Central	98.42	41.81	1.81	1.90	39.03	34.05	[illegible]	87.62	22.14	11.84	.98	[illegible]	4.04	1.08	[illegible]	4.68
100,000 and over	133.28	50.58	2.25	1.65	37.70	34.90	159.32	117.21	19.69	12.24	.90	.55	10.23	2.62	6.23	4.55
10,000-100,000	138.26	49.79	2.85	2.19	42.99	35.15	131.16	90.95	25.34	15.07	.95	1.43	4.40	1.10	8.46	5.37
2,500-10,000	120.63	53.71	1.82	2.17	41.18	35.64	128.93	92.55	[illegible]	17.21	2.17	1.43	4.48	1.28	[illegible]	5.72
Under 2,500 and rural	74.90	33.59	1.37	1.89	37.59	32.91	[illegible]	71.78	20.42	15.31	.85	1.15	[illegible]	.49	5.45	4.33
South Atlantic	106.64	41.10	1.87	1.47	39.25	31.26	135.74	103.62	34.33	20.27	1.28	1.25	3.37	.76	4.95	3.78
100,000 and over	145.70	52.37	3.10	2.40	37.53	30.92	193.12	147.59	19.76	10.47	1.61	.85	7.23	1.43	5.65	3.85
10,000-100,000	157.64	49.91	2.09	1.19	37.01	29.15	[illegible]	108.43	35.15	16.45	.93	.96	4.27	1.49	4.22	5.22
2,500-10,000	154.59	52.09	2.66	1.97	41.26	29.45	155.59	103.14	40.82	25.54	2.02	.92	4.43	.55	9.98	7.26
Under 2,500 and rural	75.66	32.25	1.32	1.18	39.76	32.40	108.18	90.96	37.34	24.35	1.17	1.50	1.83	.31	4.52	3.16

See footnote at end of table.

Appendix Table 1. *Mortality from 8 specific forms of heart disease by sex, population size groups, and geographic section of the United States: white resident age-adjusted* [1] *mortality per 100,000 population in 1940*—Continued

Geographic section and size of city	Diseases of the coronary arteries		Acute endocarditis		Chronic affections of the valves and endocardium		Diseases of the myocardium		Other diseases of the heart		Acute rheumatic fever		Syphilitic heart disease		Congenital heart disease	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
East South Central	79.41	35.58	.84	.83	43.64	34.75	103.35	81.99	35.71	23.43	1.28	1.26	2.72	.52	4.56	3.12
100,000 and over	174.22	59.17	.93	2.03	27.76	22.12	162.78	124.54	28.08	15.76	1.87	3.43	4.26	.86	7.61	3.87
10,000-100,000	129.96	52.25	---	1.78	50.50	38.77	168.97	116.16	34.25	17.52	.54	2.21	8.45	1.00	6.97	5.89
2,500-10,000	135.94	53.53	2.10	.36	48.74	38.96	132.18	84.59	38.76	26.24	.67	.67	4.62	.33	7.61	3.65
Under 2,500 and rural	51.16	25.37	.82	.52	44.46	36.10	83.23	66.87	36.59	25.71	1.37	.96	1.42	.39	3.80	2.73
West South Central	94.65	40.26	1.51	1.14	28.95	23.84	105.02	81.13	38.88	20.86	.74	1.02	4.00	.76	4.46	3.55
100,000 and over	155.77	57.89	2.97	1.44	28.29	29.64	194.07	130.41	46.82	17.69	.60	.67	10.45	1.19	6.27	4.55
10,000-100,000	151.94	56.33	2.12	2.13	26.93	21.42	135.45	93.86	42.07	29.28	.68	.80	6.47	.79	5.00	4.55
2,500-10,000	132.70	46.20	1.53	1.55	34.89	21.88	137.17	91.55	45.32	24.53	.94	1.33	3.87	.93	6.28	6.34
Under 2,500 and rural	60.05	28.50	.97	.70	23.34	23.32	73.05	59.09	34.66	21.18	.78	1.15	1.76	.56	3.74	2.70
Mountain	93.67	36.89	2.27	2.10	40.26	38.16	131.26	103.65	24.07	16.07	1.40	1.03	4.42	1.17	6.55	4.76
100,000 and over	117.28	34.38	3.97	4.47	34.59	44.52	165.34	123.28	18.38	16.31	.93	1.77	6.49	.73	8.90	4.80
10,000-100,000	123.36	50.39	3.06	2.12	46.40	36.09	166.86	116.41	26.33	17.35	1.11	.56	6.43	2.15	6.90	7.64
2,500-10,000	134.52	43.57	1.84	2.25	63.32	50.47	158.22	109.10	33.70	17.80	1.41	1.67	5.39	.82	9.50	5.62
Under 2,500 and rural	68.78	29.28	1.83	1.47	34.10	33.74	105.12	88.85	22.46	14.88	1.57	.95	3.09	.99	5.45	3.83
Pacific	136.06	48.08	2.05	1.28	37.95	29.46	183.82	126.29	15.86	9.85	.56	.59	8.16	1.97	6.71	4.62
100,000 and over	156.89	48.55	2.92	1.56	38.69	28.89	200.93	132.22	14.59	9.58	.31	.52	10.66	2.22	6.17	4.55
10,000-100,000	148.43	55.44	1.85	.98	38.70	27.99	189.84	120.70	15.77	9.48	.77	.55	6.81	1.82	8.07	5.59
2,500-10,000	143.38	50.21	2.02	1.18	46.26	33.85	189.11	124.29	21.12	13.00	1.50	.77	11.23	2.57	7.61	5.43
Under 2,500 and rural	99.78	40.95	1.20	1.08	34.70	30.61	160.25	120.70	15.98	9.87	.47	.67	5.29	1.49	6.38	4.16

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[1] Adjusted for age by the direct method to the population of the United States enumerated in 1940.

Appendix Table 2. *Mortality from 8 specific forms of heart disease by sex, age, urbanization, and geographic section of the United States: white resident mortality per 100,000 population in 1940*

Age	Male								Female							
	Diseases of the coronary arteries	Acute endocarditis	Chronic affections of the valves and endocardium	Diseases of the myocardium	Other diseases of the heart	Acute rheumatic fever	Syphilitic heart disease	Congenital heart disease	Diseases of the coronary arteries	Acute endocarditis	Chronic affections of the valves and endocardium	Diseases of the myocardium	Other diseases of the heart	Acute rheumatic fever	Syphilitic heart disease	Congenital heart disease
TOTAL UNITED STATES																
All ages	111.93	1.98	39.50	162.91	25.01	1.15	4.29	5.84	46.54	1.69	34.84	135.06	15.71	1.19	1.08	4.45
Under 5	.34	.62	1.59	1.30	2.23	.70	----------	65.36	.15	.60	1.32	1.06	2.52	.75	.02	48.41
5-9	.19	.51	3.44	.59	.89	1.92	----------	1.52	.04	.61	3.56	.37	.74	2.57	----------	1.64
10-14	.11	.84	6.07	.65	1.10	2.49	.08	.93	.12	.98	7.14	.80	.93	2.93	.02	1.00
15-19	.47	1.18	7.71	1.49	1.45	1.54	.04	1.12	.39	1.73	6.77	1.14	.99	1.50	.02	1.01
20-24	1.17	1.60	8.25	1.80	1.72	.92	.16	.92	.98	2.14	7.71	1.76	1.40	1.04	.06	.61
25-34	6.39	2.03	11.33	4.89	3.31	1.00	.54	.52	2.44	1.95	11.65	4.47	2.68	.80	.25	.50
35-44	47.36	1.94	20.12	25.26	9.54	.78	3.18	.41	9.96	1.69	20.26	16.99	4.92	.62	.55	.44
45-54	165.66	2.65	40.31	114.31	26.95	.50	9.82	.33	36.68	1.59	33.63	71.65	11.19	.46	2.02	.26
55-64	379.71	4.26	84.28	373.22	64.93	.62	17.46	.20	124.06	2.07	62.25	242.31	32.17	.64	3.53	.29
65-74	671.22	3.84	203.37	1,038.42	144.54	1.19	18.97	.34	335.91	3.05	163.29	837.16	88.51	1.14	4.67	.20
75 and over	1,075.61	6.37	552.82	3,206.87	354.81	2.67	13.08	.17	700.33	5.01	543.48	3,139.39	295.87	2.96	6.98	.08
URBAN UNITED STATES—CITIES AND TOWNS OF 2,500 AND OVER POPULATION																
All ages	134.49	2.33	38.75	196.35	23.09	1.28	5.56	6.47	51.89	1.89	35.39	153.54	13.84	1.29	1.28	5.09
Under 5	.30	.56	1.34	1.60	2.25	1.00	----------	72.39	.27	.68	1.04	1.31	2.75	1.05	----------	56.12
5-9	.26	.60	4.02	.52	.73	2.51	----------	1.73	.04	.71	4.34	.27	.62	3.10	----------	1.68
10-14	.04	1.05	7.42	.79	1.09	3.07	.07	1.16	.11	1.25	8.94	.87	.87	3.35	----------	.99
15-19	.42	1.45	9.76	1.56	1.25	1.73	.07	1.28	.30	1.88	8.65	1.39	1.02	1.52	.03	1.12
20-24	1.20	2.13	10.29	1.78	1.78	.89	.17	.96	.74	2.56	8.63	1.60	1.08	1.23	.09	.68
25-34	7.57	2.61	13.92	5.92	3.26	1.13	.69	.51	2.32	2.23	13.83	4.55	1.73	.87	.26	.48
35-44	57.95	2.49	23.56	31.19	10.07	.85	4.05	.47	10.79	1.95	23.70	18.89	4.60	.67	1.15	.44
45-54	204.06	3.18	43.62	143.42	27.32	.43	12.42	.32	41.62	1.74	37.55	83.73	10.46	.39	2.40	.32
55-64	464.58	4.96	85.90	467.36	63.79	.45	23.15	.21	141.58	2.08	65.16	289.55	30.14	.60	4.47	.30
65-74	805.01	3.78	190.29	1,281.99	129.34	1.03	24.61	.51	374.87	3.22	156.48	965.18	77.99	.71	5.29	.16
75 and over	1,229.07	4.52	450.38	3,686.55	296.01	1.84	17.24	.17	769.94	5.01	487.75	3,479.24	247.01	1.63	8.64	.13

Appendix Table 2. *Mortality from 8 specific forms of heart disease by sex, age, urbanization, and geographic section of the United States: white resident mortality per 100,000 population in 1940*—Continued

Age	Male								Female							
	Diseases of the coronary arteries	Acute endocarditis	Chronic affections of the valves and endocardium	Diseases of the myocardium	Other diseases of the heart	Acute rheumatic fever	Syphilitic heart disease	Congenital heart disease	Diseases of the coronary arteries	Acute endocarditis	Chronic affections of the valves and endocardium	Diseases of the myocardium	Other diseases of the heart	Acute rheumatic fever	Syphilitic heart disease	Congenital heart disease
RURAL UNITED STATES—TOWNS OF LESS THAN 2,500 POPULATION AND RURAL AREAS																
All ages	82.43	1.48	39.63	122.10	27.08	1.02	2.56	5.22	37.96	1.39	33.90	105.49	18.66	1.10	0.74	3.83
Under 5	.38	.67	1.84	1.09	2.21	.42	----------	58.58	.04	.52	1.60	.82	2.30	.44	.04	40.98
5-9	.12	.41	2.89	.66	1.03	1.36	----------	1.32	.04	.52	2.79	.47	.86	2.06	----------	1.59
10-14	.19	.62	4.67	.59	1.12	1.89	.08	.69	.12	.69	5.23	.73	.97	2.48	.04	1.01
15-19	.53	.88	5.45	1.41	1.68	1.33	----------	.95	.50	1.53	4.43	.83	.95	1.49	----------	.87
20-24	1.14	.91	5.55	1.82	1.64	.96	.14	.86	1.36	1.46	6.21	2.02	1.92	.71	----------	.50
25-34	4.62	1.16	7.47	3.35	3.38	.82	.32	.53	2.64	1.46	7.98	4.33	2.70	.67	.34	.53
35-44	30.59	1.06	14.68	15.87	8.70	.66	1.78	.31	8.51	1.24	14.24	13.68	5.50	.54	.60	.44
45-54	106.06	1.82	35.17	69.11	26.38	.62	5.77	.35	28.21	1.33	26.92	59.93	12.44	.43	1.37	.16
55-64	265.51	3.32	82.10	246.55	66.46	.84	9.81	.19	95.81	2.03	57.55	166.14	35.44	.71	2.00	.27
65-74	517.72	3.90	218.39	758.97	161.99	1.39	12.50	.15	273.46	2.80	174.21	631.93	105.37	1.83	3.67	.26
75 and over	913.31	8.32	661.17	2,699.57	416.99	3.54	8.68	.18	593.21	5.01	629.24	2,616.38	371.07	5.01	4.43	----------
TOTAL NORTH[1]																
All ages	120.23	2.25	41.09	193.83	22.57	1.32	4.03	6.32	50.53	1.94	38.05	165.19	14.62	1.35	1.07	4.97
Under 5	.28	.74	1.54	1.30	1.67	.75	----------	70.86	.10	.73	1.02	.97	1.99	1.11	.05	53.97
5-9	.14	.73	4.41	.54	.54	2.41	----------	1.27	.09	.85	4.62	.38	.66	2.92	----------	1.88
10-14	.16	1.14	7.24	.67	.98	2.99	.16	1.14	.12	1.30	9.33	.81	.89	3.45	----------	.97
15-19	.37	1.51	10.33	1.73	1.51	1.77	----------	1.40	.48	1.91	9.14	1.42	.85	1.79	.04	1.34
20-24	1.20	1.86	10.63	1.78	1.98	1.08	.12	1.09	.86	2.74	9.28	1.89	1.17	1.24	.04	.71
25-34	7.29	2.59	15.01	5.72	3.01	1.32	.54	.58	2.30	2.24	14.99	5.33	2.00	.97	.20	.48
35-44	51.77	2.34	23.50	29.61	9.15	.85	2.90	.37	10.45	1.72	24.56	20.36	4.64	.80	.94	.53
45-54	179.39	2.54	43.79	134.42	25.07	.55	9.32	.25	40.34	1.86	37.98	90.07	10.98	.53	2.20	.29
55-64	407.02	4.42	83.80	443.84	59.24	.52	17.26	.22	140.14	2.08	67.93	393.58	31.35	.62	3.74	.39
65-74	725.81	3.62	197.70	1249.18	126.27	.92	17.31	.39	367.08	3.27	168.35	1032.22	80.32	.62	4.38	.12
75 and over	1130.51	7.19	542.17	3890.38	318.84	2.34	9.37	.17	735.83	6.07	551.32	3768.12	272.95	1.24	6.07	.14

URBAN NORTH [1]—CITIES AND TOWNS OF 2,500 AND OVER POPULATION

All ages	130.23	2.34	38.69	213.17	20.98	1.42	4.49	6.23	52.16	1.97	37.87	175.72	13.29	1.43	1.10	5.04
Under 5	.28	.57	1.45	1.27	1.77	.99	----------	69.15	.07	.59	1.10	1.02	1.91	1.25	----------	54.92
5-9	.07	.62	5.09	.55	.48	2.89	----------	1.38	.07	.92	5.18	.25	.64	2.23	----------	1.77
10-14	.06	1.11	8.30	.70	.94	3.27	.12	1.29	.12	1.37	10.37	.71	.71	5.46	----------	.89
15-19	.38	1.68	11.48	1.73	1.30	1.95	----------	1.35	.32	1.94	10.30	1.58	.89	1.73	.05	1.31
20-24	1.09	2.18	12.14	1.63	2.01	.98	.05	1.25	.80	2.69	9.99	1.59	1.24	1.44	.05	.75
25-34	7.55	2.85	17.06	6.24	2.79	1.40	.57	.57	2.18	2.44	16.12	4.84	1.75	.98	.16	.45
35-44	57.58	2.68	25.47	32.54	9.56	.97	3.65	.44	12.55	1.88	26.92	21.21	4.19	.85	.61	.55
45-54	197.64	2.70	44.11	152.18	24.75	.55	10.20	.21	41.87	1.71	40.09	97.65	10.78	.57	2.14	.36
55-64	448.79	4.51	90.16	503.09	57.78	.38	19.50	.27	147.56	2.30	68.02	339.26	29.94	.64	4.12	.43
65-74	785.23	3.40	178.33	1,399.55	117.31	.93	19.76	.71	381.68	3.71	179.40	1,116.21	75.53	.70	4.36	----------
75 and over	1,169.43	5.32	431.55	4,035.71	268.75	1.68	11.49	----------	746.02	5.25	548.74	3,921.78	231.99	1.22	6.52	.20

RURAL NORTH [1]—TOWNS OF LESS THAN 2,500 POPULATION AND RURAL AREAS

All ages	98.38	1.96	44.04	156.33	25.16	1.10	3.63	6.56	46.72	1.81	37.68	140.68	17.82	1.16	1.01	4.57
Under 5	.27	1.09	1.63	1.36	1.50	.27	----------	74.16	.14	.99	.85	.87	2.13	.87	.14	72.13
5-9	.27	.93	3.07	.53	.67	1.47	----------	1.67	.14	.79	2.51	.56	.79	2.10	----------	2.11
10-14	.36	1.20	5.06	.60	1.08	2.41	.24	.84	.13	1.15	7.13	1.62	1.47	3.41	----------	1.15
15-19	.35	1.16	7.85	1.73	1.96	1.39	----------	1.56	.96	1.80	6.29	1.63	.77	1.92	----------	1.41
20-24	1.48	1.08	6.88	2.16	1.89	1.35	.27	.67	1.08	2.92	7.67	2.46	.62	.12	----------	.62
25-34	6.57	1.88	9.38	4.30	3.60	1.10	.47	.63	2.67	1.92	11.47	6.85	2.76	.92	.33	.58
35-44	35.38	1.40	17.91	21.34	7.99	.53	2.46	.15	10.14	1.22	17.27	17.74	6.61	.66	1.05	.47
45-54	130.34	2.14	42.92	86.67	25.92	.56	6.97	.37	32.62	2.26	30.16	65.23	12.14	.41	2.57	.10
55-64	314.25	4.22	91.92	312.20	62.49	.84	12.30	.12	121.17	1.51	67.70	230.10	34.97	.54	2.74	.27
65-74	620.26	4.02	232.10	982.12	142.18	.92	12.98	.18	333.83	2.71	189.63	832.70	91.69	.42	4.38	.42
75 and over	1,072.86	9.96	705.56	3,451.84	393.04	3.33	6.23	.42	714.40	7.70	650.20	3,444.90	369.13	1.29	4.25	----------

TOTAL SOUTH [2]

All ages	96.34	1.48	40.97	123.34	34.91	1.27	3.12	4.80	39.67	1.23	32.57	97.47	21.44	1.26	.67	3.52
Under 5	.40	.20	2.08	1.19	2.28	.99	----------	54.29	.20	.51	1.84	1.23	2.77	.62	----------	39.12
5-9	.20	.20	3.15	.79	1.67	1.77	----------	1.18	----------	.30	2.53	.61	.91	3.14	----------	.91
10-14	.09	.65	5.27	.19	1.48	2.69	----------	.74	----------	.48	4.51	.77	1.05	2.49	----------	.58
15-19	.46	.55	5.24	.83	1.93	1.47	----------	.37	.37	1.30	4.09	.65	.84	1.12	----------	.37
20-24	1.46	1.14	4.68	1.77	.73	.83	.21	1.04	1.53	1.23	5.62	1.74	2.04	.61	----------	.41
25-34	5.66	.94	6.66	3.83	4.01	.89	.29	.47	2.73	1.34	7.20	3.77	3.25	.76	.64	.70
35-44	47.06	1.66	15.00	21.42	12.52	.61	2.41	.23	10.31	1.34	13.37	14.49	6.65	.67	.45	.22
45-54	155.90	2.36	33.93	89.92	34.12	.66	8.01	.28	31.42	.96	27.39	51.31	15.76	.19	.67	.10
55-64	341.98	4.08	87.47	288.11	89.64	1.76	11.29	----------	106.17	2.32	58.62	173.26	44.55	.55	2.46	.41
65-74	534.26	3.40	238.84	753.40	214.38	1.13	14.49	.45	272.28	2.25	164.41	581.95	124.54	2.93	3.38	----------
75 and over	844.14	4.44	669.10	2,446.81	509.28	5.08	8.24	----------	577.37	3.91	598.59	2,305.02	392.55	7.26	3.35	----------

See footnotes at end of table.

Appendix Table 2. *Mortality from 8 specific forms of heart disease by sex, age, urbanization, and geographic section of the United States: white resident mortality per 100,000 population in 1940*—Continued

Age	Male								Female							
	Diseases of the coronary arteries	Acute endocarditis	Chronic affections of the valves and endocardium	Diseases of the myocardium	Other diseases of the heart	Acute rheumatic fever	Syphilitic heart disease	Congenital heart disease	Diseases of the coronary arteries	Acute endocarditis	Chronic affections of the valves and endocardium	Diseases of the myocardium	Other diseases of the heart	Acute rheumatic fever	Syphilitic heart disease	Congenital heart disease
URBAN SOUTH [2]—CITIES AND TOWNS OF 2,500 AND OVER POPULATION																
All ages	151.20	2.13	38.97	171.78	30.61	1.34	5.63	6.48	52.65	1.72	30.56	120.76	16.62	1.34	1.13	4.98
Under 5	.38	.38	1.13	3.02	4.90	1.88	----------	75.77	.78	.39	.78	1.56	5.06	1.17	----------	56.79
5-9	.38	.77	2.30	.38	1.53	1.92	----------	1.53	----------	----------	1.95	.39	.39	3.90	----------	.39
10-14	----------	1.02	6.77	----------	2.37	3.05	----------	1.02	----------	1.02	4.76	1.02	1.36	3.74	----------	.68
15-19	.31	.62	8.12	.94	1.25	1.25	----------	----------	----------	2.02	4.32	.86	.86	1.15	----------	.58
20-24	2.35	1.47	8.81	2.64	.59	1.18	.59	----------	1.03	2.06	5.66	2.06	.51	.77	----------	.51
25-34	8.74	.60	7.08	4.52	4.22	1.51	.30	.45	2.51	1.95	9.77	4.33	3.07	1.12	.84	.98
35-44	75.32	3.01	19.53	28.17	13.52	.75	3.76	----------	13.68	1.95	17.24	15.82	5.86	.18	.71	.36
45-54	253.41	3.36	36.24	127.91	36.72	.24	13.92	.48	40.43	2.07	28.48	66.62	13.09	----------	1.15	.23
55-64	533.96	7.05	91.22	426.80	54.17	1.11	23.36	----------	144.83	1.64	58.46	222.01	34.48	.33	5.25	----------
65-74	828.03	4.06	217.83	1,097.96	171.15	.68	24.35	1.35	372.99	3.25	152.88	719.96	88.37	1.63	5.42	----------
75 and over	1,303.10	3.87	524.73	3,189.02	357.25	1.94	15.49	----------	783.17	5.36	476.07	2,829.59	300.39	5.36	4.02	----------
RURAL SOUTH [2]—TOWNS OF LESS THAN 2,500 POPULATION AND RURAL AREAS																
All ages	65.33	1.11	41.78	97.56	37.04	1.26	1.65	4.22	29.38	0.90	33.96	80.88	24.93	1.28	0.35	2.97
Under 5	.40	.13	2.42	.54	1.34	.67	----------	46.63	----------	.56	2.22	1.11	1.95	.42	----------	32.81
5-9	.13	----------	3.44	.93	1.72	1.72	----------	1.06	----------	.41	2.74	.69	1.10	2.85	----------	1.10
10-14	.13	.51	4.71	.25	1.15	2.55	----------	.64	----------	.27	4.41	.67	.94	2.00	----------	.53
15-19	.52	.52	4.04	.78	2.22	1.56	----------	.52	.55	.96	3.98	.55	.82	1.09	----------	.27
20-24	.97	.97	2.41	1.29	.80	.64	----------	1.61	1.86	.68	4.91	1.52	3.05	.51	----------	.34
25-34	3.68	1.16	6.39	3.39	3.87	.49	.29	.48	2.88	.89	5.37	3.38	2.33	.50	.50	.50
35-44	28.10	.76	11.97	16.89	11.85	.51	1.51	.38	7.86	.90	10.57	13.54	7.22	1.03	.26	.13
45-54	92.82	1.71	32.44	65.35	32.44	.94	4.19	.16	24.94	.17	26.60	40.31	17.68	.33	.33	----------
55-64	230.75	2.36	85.29	207.76	92.81	2.15	4.30	----------	73.63	2.81	58.74	138.53	51.72	.70	.47	.70
65-74	386.51	3.06	249.39	580.11	236.13	1.36	9.53	----------	200.72	1.54	172.59	483.88	150.25	3.85	1.93	----------
75 and over	620.58	4.72	759.42	2,085.25	568.71	6.60	4.72	----------	430.55	2.87	686.60	1,930.77	458.29	8.61	2.87	----------

North: New England, Middle Atlantic, and East North Central regions. [2] South: South Atlantic and East South Central regions.

New *Salmonella* Type: *Salmonella duval*

By P. R. Edwards and Mary G. West*

Salmonella duval is represented by two cultures, both of which were isolated from rectal swabs taken from two normal dogs during the course of a survey to determine the incidence of *Salmonella* carriers among dogs in Florida. The cultures were isolated by Mrs. Mildred M. Galton who recognized them as unusual *Salmonella* types and forwarded them for identification.

The cultures were typical members of the genus *Salmonella*. They were motile rods which produced hydrogen sulfide and utilized citrate and d-tartrate but failed to produce indol, to hydrolyze urea, or to liquefy gelatin. Acid and gas were produced from glucose, arabinose, maltose, mannitol, and sorbitol. Lactose, sucrose, raffinose, dulcitol, inositol, adonitol, and salicin were not attacked.

The O antigens of the organisms were closely related to those of *Salmonella riogrande* (XL). Antigen I was present in the cultures and was subject to form variation, as it is in many *Salmonella* types.[1] In absorption tests the organisms removed all agglutinins from O serums prepared from *S. riogrande* (XL) and from *Salmonella allandale* (I, XL).

The H antigens of the organisms were diphasic and phase 1 was flocculated to the titer of serum derived from phase 1 of *Salmonella paratyphi B* (b). In absorption tests *S. duval* reduced the titer of the serum from 10,000 to 100. Phase 1 of *S. duval* may be denoted by the symbol b. Phase 2 of *S. duval* was agglutinated in high dilution by e, n, x and e, n, z_{15} serums. When tested with absorbed serums for factors x and z_{15} it was agglutinated only by the latter. In absorption tests phase 2 of *S. duval* removed all agglutinins from serum derived from phase 2 of *Salmonella glostrup* (e, n, z_{15}). The antigenic formula of *S. duval* is I, XL:b-e, n, z_{15}.

Summary

A new *Salmonella* type, *Salmonella duval*, having the antigenic formula I, XL:b–e, n, z_{15} is described. It is represented by two cultures both of which were isolated from the intestinal tracts of normal dogs.

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[1] Kauffmann, F.: Proc. 3d Internat. Cong. Microbiol. 1940, pp. 628–629.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JUNE 10, 1950

Poliomyelitis

Reported cases of poliomyelitis in the United States increased from 132 last week to 206 for the current week. For the corresponding weeks of last year, 156 and 243 cases, respectively, were reported. The largest numbers of cases for the current week were reported by Texas (61), California (18), Missouri (12), and Louisiana (9). For the preceding week the largest number of cases were reported by Texas (55), California (18), Oklahoma (12), and Florida (7).

The cumulative total number of poliomyelitis cases for the calendar year is misleading because the calendar year does not correspond with the "disease" year. A calendar year covers January through December, while the "disease" year for poliomyelitis covers March through February. Therefore, the 1950 calendar year includes the

Comparative Data for Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended		5-year median 1945–49	Seasonal low week	Cumulative total since seasonal low week		5-year median 1944–45 through 1948–49	Cumulative total for calendar year		5-year median 1945–49
	June 10, 1950	June 11, 1949			1949–50	1948–49		1950	1949	
Anthrax (062)	1	2	(1)	(1)	(1)	(1)	(1)	19	28	(1)
Diphtheria (055)	69	109	152	27th	7,157	8,554	13,275	2,880	3,440	5,709
Acute infectious encephalitis (082)	12	16	7	(1)	(1)	(1)	(1)	295	233	200
Influenza (480–483)	1,015	896	691	30th	272,613	108,810	178,126	242,083	72,540	134,508
Measles (085)	14,273	16,813	16,813	35th	253,699	588,507	503,970	234,509	536,114	469,024
Meningococcal meningitis (057.0)	75	59	60	37th	2,973	2,685	2,914	2,060	1,814	1,942
Pneumonia (490–493)	1,513	1,045	------	(1)	(1)	(1)	-------	52,245	47,152	--------
Acute poliomyelitis (080)	206	243	160	11th	1,087	1,103	725	2,221	2,018	1,192
Rocky Mountain spotted fever (104)	23	27	22	(1)	(1)	(1)	(1)	100	155	105
Scarlet fever (050)	946	1,075	1,555	32d	52,909	76,624	82,426	36,470	54,080	55,740
Smallpox 084	1	1	2	35th	43	50	190	23	40	136
Tularemia (059)	12	33	28	(1)	(1)	(1)	(1)	446	563	446
Typhoid and paratyphoid fever (040, 041) [2]	65	89	80	11th	669	641	728	1,179	1,129	1,201
Whooping cough (056)	3,150	1,216	1,886	39th	83,036	33,725	72,605	61,500	23,692	46,339

[1] Not computed.

[2] Including cases reported as salmonellosis.

declining phase of last year's high incidence. On this basis, the total for the current "disease" year is slightly less than the corresponding total for last year, 1,087 cases as compared with 1,103. Corresponding cumulative totals by State show Texas with 375 cases which may be compared with 358 last year, and California with 163 cases which may be compared with 116 cases last year.

Other Diseases

The total number of cases of influenza reported was 1,015 as compared with 1,590 last week and 896 for the corresponding period last year. The 5-year (1945-49) median was 691. States reporting the largest number of influenza cases for the week were Texas (437), Virginia (199), and Arizona (96)

Incidence of whooping cough reported increased from 2,484 cases last week to 3,150 for the current week. For the corresponding period last year, 1,216 cases were reported. The 5-year median was 1,886.

One case of anthrax was reported in New Jersey, and one case of smallpox was reported in Kansas. Reported cases of infectious encephalitis numbered 12 for the week as compared with 9 for the preceding week, 16 for the corresponding week last year, and 7 for the 5-year median.

DEATHS DURING WEEK ENDED JUNE 10, 1950

	Week ended June 10, 1950	Corresponding week, 1949
Data for 93 large cities of the United States:		
Total deaths	9,117	8,993
Median for 3 prior years	8,922	----------------
Total deaths, first 23 weeks of year	221,635	219,235
Deaths under 1 year of age	652	590
Median for 3 prior years	610	----------------
Deaths under 1 year of age, first 23 weeks of year	14,254	14,884
Data from industrial insurance companies:		
Policies in force	69,689,748	70,406,105
Number of death claims	12,805	12,470
Death claims per 1,000 policies in force, annual rate	9.6	9.2
Death claims per 1,000 policies, first 23 weeks of year, annual rate	9.9	9.6

Reported Cases of Selected Communicable Diseases: United States, Week Ended June 10, 1950

[Numbers under diseases are International List Numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480-483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490-493)	Poliomyelitis (080)
United States	69	12	1,015	14,273	75	1,513	206
New England	**3**	-----	**6**	**1,816**	**1**	**75**	**1**
Maine	-----	-----	6	16	-----	31	-----
New Hampshire	-----	-----	-----	24	-----	1	-----
Vermont	-----	-----	-----	7	-----	-----	-----
Massachusetts	3	-----	-----	1,179	-----	-----	-----
Rhode Island	-----	-----	-----	12	1	1	-----
Connecticut	-----	-----	-----	578	-----	30	1
Middle Atlantic	**7**	**4**	**2**	**4,749**	**16**	**332**	**10**
New York	4	3	[1] 1	1,622	8	188	6
New Jersey	3	1	1	1,987	4	52	2
Pennsylvania	-----	-----	-----	1,140	4	92	2
East North Central	**5**	**3**	**20**	**4,341**	**15**	**162**	**24**
Ohio	2	-----	4	762	6	41	4
Indiana	1	1	-----	358	1	8	-----
Illinois	1	-----	3	1,155	3	68	6
Michigan	-----	2	-----	1,037	2	37	6
Wisconsin	1	-----	13	1,029	3	8	8
West North Central	**4**	**2**	**17**	**670**	**4**	**140**	**34**
Minnesota	1	1	2	271	1	13	5
Iowa	-----	-----	-----	126	2	-----	7
Missouri	1	-----	1	36	-----	13	12
North Dakota	1	1	9	3	-----	107	-----
South Dakota	-----	-----	-----	31	-----	1	-----
Nebraska	-----	-----	4	127	-----	-----	7
Kansas	1	-----	1	76	1	15	3
South Atlantic	**15**	**1**	**320**	**607**	**16**	**397**	**16**
Delaware	-----	-----	-----	11	-----	-----	-----
Maryland	1	-----	27	60	2	53	1
District of Columbia	-----	-----	-----	50	1	26	-----
Virginia	4	-----	199	110	5	30	-----
West Virginia	1	-----	7	151	-----	6	1
North Carolina	6	-----	-----	82	-----	-----	3
South Carolina	1	-----	5	39	1	7	6
Georgia	2	1	82	17	4	206	-----
Florida	-----	-----	-----	87	3	9	5
East South Central	**11**	**1**	**19**	**226**	**8**	**67**	**13**
Kentucky	2	-----	-----	109	5	21	1
Tennessee	6	1	9	56	1	-----	2
Alabama	2	-----	2	30	1	26	3
Mississippi	1	-----	8	31	1	20	7
West South Central	**18**	**1**	**472**	**538**	**10**	**244**	**80**
Arkansas	2	-----	8	80	-----	15	6
Louisiana	2	-----	3	14	4	19	9
Oklahoma	-----	-----	24	12	2	10	4
Texas	14	1	437	423	4	191	61
Mountain	-----	-----	**146**	**479**	**1**	**35**	**5**
Montana	-----	-----	13	28	-----		1
Idaho	-----	-----	28	113	-----		2
Wyoming	-----	-----	-----	15	-----	1	-----
Colorado	-----	-----	9	83	-----	11	1
New Mexico	-----	-----	-----	42	-----	6	1
Arizona	-----	-----	96	58	-----	15	-----
Utah	-----	-----	-----	140	1	2	-----
Nevada	-----	-----	-----	-----	-----	-----	-----
Pacific	**6**	-----	**13**	**847**	**4**	**52**	**23**
Washington	-----	-----	1	105	-----	-----	1
Oregon	-----	-----	9	16	-----	10	4
California	6	-----	3	726	4	33	18
Alaska	-----	-----	-----	-----	-----	-----	-----
Hawaii	-----	-----	1	4	-----	-----	-----

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[1] New York City only.

Anthrax: New Jersey, 1 case.

Reported Cases of Selected Communicable Diseases: United States, Week Ended June 10, 1950—Continued

[Numbers under diseases are International List Numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Small-pox (084)	Tularemia (059)	Typhoid and paratyphoid fever [1] (040, 041)	Whooping cough (056)	Rabies in animals
United States	23	946	1	12	65	3,150	157
New England		184			2	406	
Maine		7				31	
New Hampshire		5				10	
Vermont		2				21	
Massachusetts		139			1	167	
Rhode Island		6				67	
Connecticut		25			1	110	
Middle Atlantic	1	243			7	384	17
New York		[2] 134			5	112	13
New Jersey	1	32			2	151	
Pennsylvania		77				121	4
East North Central		248		1	8	502	47
Ohio		89			2	151	4
Indiana		8			3	36	[1] [3] 34
Illinois		24			3	61	5
Michigan		92		1		159	4
Wisconsin		35				95	
West North Central		48	1		1	155	14
Minnesota		6				26	
Iowa		6			1	16	8
Missouri		9				55	
North Dakota		2				7	
South Dakota						12	
Nebraska		15				3	
Kansas		10	1			36	6
South Atlantic	16	39			5	323	24
Delaware						7	
Maryland	5	13			1	42	
District of Columbia						2	
Virginia	5	9				84	4
West Virginia	2	2			2	46	6
North Carolina	3	9			1	86	
South Carolina						26	4
Georgia	1	5			1	23	10
Florida		1				7	
East South Central	4	24		2	5	623	28
Kentucky		11				509	12
Tennessee	4	8				57	7
Alabama		5			2	53	7
Mississippi				2	3	4	2
West South Central		21		6	16	393	17
Arkansas		2		5	1	93	1
Louisiana		3			5	4	1
Oklahoma		5			1	21	2
Texas		11		1	9	275	13
Mountain	2	23		3	3	120	
Montana		5		1		10	
Idaho		2				12	
Wyoming	1					4	
Colorado	1	4				32	
New Mexico		1				11	
Arizona		8			3	38	
Utah		3		2		13	
Nevada							
Pacific		116			18	244	10
Washington		16				41	
Oregon		4				49	
California		96			18	154	10
Alaska						2	
Hawaii		1					

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[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.
[3] Report for 3 weeks.

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended May 27, 1950.—Cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis						1	1		2		4
Chickenpox	1		18	1	165	249	31	10	66	111	652
Diphtheria					3						3
Dysentery, bacillary					7		1		[1] 1	1	10
German measles			38		18	1,304	2	122	66	388	1,938
Influenza			19			5	1				25
Measles			11	51	561	527	11	16	20	230	1,427
Meningitis, meningococcal			1		1	2					4
Mumps			35	4	233	380	8	64	118	164	1,006
Poliomyelitis										1	1
Scarlet fever	5		3		55	35	2	4	31	11	146
Tuberculosis (all forms)	9		4	6	103	16	3	15	68	27	251
Typhoid and paratyphoid fever				1	7	1	1			4	14
Venereal diseases:											
Gonorrhea	10		18	4	62	41	(2)	12	29	36	212
Syphilis	8		10	7	58	19	(2)	3	1	10	116
Whooping cough			2		94	62		1	4	75	238

[1] Type not segregated.
[2] Report not received.

CUBA

Habana—Notifiable diseases—5 weeks ended April 29, 1950.—Cases and deaths of certain notifiable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox	20		Poliomyelitis	1	
Diphtheria	15	1	Tuberculosis	3	1
Measles	2		Typhoid fever	4	

Provinces—Notifiable diseases—5 weeks ended April 29, 1950.—Cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	6	18	13	28	2	25	92
Chickenpox	1	36	13	131	22	13	216
Diphtheria	1	17		2	2	1	23
Leprosy		8		1	1	2	12
Malaria						22	22
Measles		6			2	14	22
Poliomyelitis	2	1	1	1	1		6
Tuberculosis	3	24	18	9	14	21	89
Typhoid fever	2	11	4	6	7	17	47
Whooping cough		10		23	1		34

[1] Includes the city of Habana.

JAMAICA

Notifiable diseases—4 weeks ended May 27, 1950.—Cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	29	41	Scarlet fever	1	1
Diphtheria	1		Tuberculosis (pulmonary)	45	50
Dysentery, unspecified	1	1	Typhoid fever	7	33
Erysipelas	1	1	Typhus fever (murine)	4	
Leprosy	1	1			

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

CHOLERA

(Cases)

Place	January–March 1950	April 1950	May 1950 - week ended—			
			6	13	20	27
ASIA						
Burma	6	2	1			1
Akyab						1
Bassein		1				
Maubin	2					
Rangoon	1					
India	28,216	16,541	2,658	491	431	308
Ahmedabad					3	
Allahabad					3	
Bombay			[1] 1			
Calcutta	[2] 1,855	2,942	492	490	422	308
Cawnpore				1		
Cocanada	2					
Cuddalore	26	5				
Lucknow					3	
Madras	11					
Masulipatam	46					
Negapatam	67					
Port Blair (Andaman Island)		[1] 2				
Tellicherry	27					
Tuticorin	25					
Indochina	6			1		
Cambodia	5					
Cochinchina	1			1		
Giadinh				1		
Rachgia	1					
Pakistan	6,636	8,540	[3] 1,414	[3] 246	[3] 98	
Chittagong	25	28	5	9	29	29
Dacca	19	134	4	7		

[1] Imported.

[2] Includes imported cases.

[3] Preliminary figures.

PLAGUE

(Cases; P=present)

Place	January-March 1950	April 1950	May 1950—week ended— 6	13	20	27
AFRICA						
Belgian Congo	3	1	1			2
Costermansville Province	2		1			1
Stanleyville Province	1	1				1
Madagascar	31	7		[1] 1		
Rhodesia, Northern	2					
Union of South Africa	4	1		1		
Orange Free State	2	1		1		
ASIA						
Burma	[2] 177	27	1	2	1	
Bassein		1				
Bhamo	[3] 2					
Henzada	11	1				
Kyaiklat	32	2				
Moulmein				[3] 1		
Myaungmya	2	3				
Myingyan	2					
Pegu		1				
Rangoon		[3] 2	1	[3] 1	1	
Yenangyaung	58					
China:						
Chekiang Province	10					
Wenchow	[4] 4					
Fukien Province	126					
Kwangsi Province	[4] 63					
Kwangtung Province	15					
India	[2] 29,082	6,506	[5] 192	2	2	1
Allahabad	[3] 1	[3] 13	[3] 3	[3] 1		
Bombay		2	[3] 1	1	1	
Calcutta	[3] 1				1	1
Cawnpore	9	9				
Lucknow	5	3	[3] 1			
Indochina (French).						
Annam	30	12	5	6	5	
Cambodia	9				[6] 31	[6] 2
Cochinchina		2	5			
Laos	2					
Indonesia:						
Java	258	35	11	7	2	
Bandoeng	2					
Jogjakarta	256	35	11	7	2	
Pakistan	[3] 1					
Karachi	[3] 1					
Thailand (Siam)	51	1				
SOUTH AMERICA						
Ecuador	10					
El Oro Province	4					
Loja Province	6					
Peru	5					
Piura Department	5					
Venezuela		5				
Miranda State		5				

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[1] May, 10, 1950. [2] Includes imported cases. [3] Imported. [4] Deaths. [5] Preliminary figures.
[6] Includes suspected cases.

SMALLPOX

(Cases; P=present)

AFRICA						
Algeria	30	13				
Angola	80					
Bechuanaland	5					
Belgian Congo	628	339	110	115		
British East Africa:						
Kenya	5	1				
Nyasaland	203	23				
Tanganyika	197	45	[1] 1	[1] 2		
Uganda	1					
Cameroon (British)	232					
Cameroon (French)	19	15				
Dahomey	172	10		[2] 7	[3] 8	

See footnotes at end of table.

SMALLPOX—Continued

Place	January–March 1950	April 1950	May 1950—week ended— 6	13	20	27
AFRICA—continued						
Egypt	[4] 3	1				
Eritrea	1					
Ethiopia	7					
French Equatorial Africa	362	41		[2] 8		
French Guinea	2	2		[2] 6		
French West Africa: Haute Volta	119	8		[2] 14		
Gambia	4					
Gold Coast	6	[5] 56			[6] 18	[7] 14
Ivory Coast	365	79	45			
Libya	2					
Mauritania	1					
Morocco (French)	5					
Mozambique	63	26				
Nigeria	6,677	1,756	[8] 36			
Niger Territory	504	131		[2] 105		
Rhodesia:						
Northern	3	1				
Southern	246					
Senegal	2					
Sierra Leone	16					
Sudan (Anglo-Egyptian)	27	21	1	2	1	
Sudan (French)	62	31				
Togo (French)	38	4				
Tunisia	1					
Union of South Africa	272	P				
ASIA						
Afghanistan	151					
Arabia	270	41				
Bahrein Islands: **Bahrein**	11	23				
Burma	[4] 4,296	502	39	23	17	7
China	457	130				
India	45,535	23,150	2,722	[9] 300	[9] 319	[9] 238
India (Portuguese)	1					
Indochina (French)	242	20		3	2	
Indonesia:						
Borneo		101				
Java	440	508	30	20	27	4
Sumatra	124	54	12	8	8	
Iran	124	21				
Iraq	72	28	8	2	4	
Israel	15					
Japan	3	1				
Korea (Southern)	1,229	[10] 7				
Lebanon	[11] 1					
Pakistan	4,852	3,482	[9] 66	[9] 42	[9] 27	[9] 14
Palestine	79	8				
Syria	15					
Thailand (Siam)	444	13				
Transjordan	19		2			
Turkey (See Turkey in Europe).						
EUROPE						
Great Britain:						
England: **Liverpool**		[11] 1				
Scotland: **Glasgow**		[12] 21				
Turkey	11	6				
NORTH AMERICA						
Guatemala	1					
Mexico	73	37	1	17		
SOUTH AMERICA						
Argentina	195	104	45			
Brazil	18	5				
Chile	[13] 133	[14] 2,847			[15] 180	[16] 72
Colombia	[17] 41	[17] 16				
Ecuador	70	5				
Peru	[18] 303					
Venezuela	29	13				
OCEANIA						
Australia: **Fremantle**	[11] 1					

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[1] In Lindi. [2] May 1-10, 1950. [3] May 11-20, 1950. [4] Includes imported cases. [5] Apr. 1-May 5, 1950. [6] May 6-15, 1950. [7] May 15-25, 1950. [8] In Lagos only. [9] In ports only. [10] In Seoul only. [11] Imported. [12] Reported Mar. 26-Apr. 11, 1950. [13] To Apr. 2, 1950. [14] Apr. 3-May 3, 1950. [15] May 10-15, 1950. [16] May 16-22, 1950. [17] In Medellin. [18] Jan. 1-31, 1950.

TYPHUS FEVER*

(Cases; P=present)

Place	January–March 1950	April 1950	May 1950—week ended—			
			6	13	20	27
AFRICA						
Algeria	47	16				
Basutoland	20					
Belgian Congo	[1] 17	22	4			
British East Africa: Kenya	4	[2] 3				
Egypt	27	13	3	1	12	
Eritrea	8				2	
Ethiopia	184					
French Equatorial Africa	4					
Gold Coast	5					
Libya	50	17	4	2	4	5
Madagascar	[2] 1					
Morocco (French)	3					
Morocco (International Zone)	1					
Morocco (Spanish Zone)	[3] 3					
Nigeria	1					
Sierra Leone	[2] 1					
Sudan (Anglo-Egyptian)	4					
Tunisia	34	1				
Union of South Africa	29	P		1		
ASIA						
Afghanistan	524					
Burma	[2] 8					
China	[1] 8					
India	105	36	7	1		1
India (Portuguese)	1					
Indochina (French)	5	5	10	3	5	
Indonesia:						
Java	6					
Sumatra	1					
Iran	73	32	5			
Iraq	44	35	2	6	2	1
Japan	671	97				
Korea (Southern)	[2] 1,042	[4] 61				
Lebanon	1					
Pakistan	32	21	7	2	1	
Palestine: Jerusalem						1
Straits Settlements: Singapore	[1] 3					
Syria	[1] 4	[1] 27	[2] 1	1	1	
Transjordan	12				1	
Turkey (see Turkey in Europe).						
EUROPE						
France	1					
Germany (British Zone)	[1] 2					
Germany (French Zone)	2					
Germany (United States Zone)	1					
Great Britain: Island of Malta	[2] 2		[2] 1			
Greece	[2] 19					
Hungary	2	1				
Italy	23					
Sicily	15					
Poland	37					
Spain	7	6				
Turkey	91	20	3	2	1	5
Yugoslavia	76	62	21			
NORTH AMERICA						
Costa Rica [2]	5					
Guatemala	8					
Jamaica [2]	3	4	2	2		
Mexico [1]	31	7	1	1	2	1
Puerto Rico [2]	4					
SOUTH AMERICA						
Argentina	[2] 1					
Chile	45	7	2	1	1	1
Colombia	80	21				
Curaçao	1					
Ecuador	61	5				
Peru	[3] 105					
Venezuela	[2] 3	[2] 2	[2] 1		[2] 1	
OCEANIA						
Australia [2]	34	23	2	1		
Hawaii Territory [2]	1		[5] 1			

*Reports from some areas are probably murine type, while others include both murine and louse-borne types.
[1] Includes murine type. [2] Murine type. [3] Jan. 1–31, 1950. [4] In Inchon and Seoul only. [5] Off-shipping.

YELLOW FEVER

(C=cases; D=deaths)

Place	January-March 1950	April 1950	May 1950—week ended—			
			6	13	20	27
AFRICA						
French Equatorial Africa C	1					
Port Gentil C	[1] 1					
Gold Coast C	9	1				
Ankobra Ferry D	1					
Bisiasi D	(2)					
Kado C	1					
Oda Area:						
Akwatia C	[1] [3] 6	[1] 1				
Atiankama C	1					
Sierra Leone C	1					
Koinadugu District C	1					
NORTH AMERICA						
Panama:						
Colon D	1					
SOUTH AMERICA						
Bolivia:						
Chuquisaca Department C	[4] 850					
La Paz Department C			[5] 17			
Colombia:						
Mocoa Locality D		2				
Peru:						
San Martin Department D	1		1			

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[1] Suspected. [2] The fatal suspected case reported in Bisiasi Mar. 23, 1950, was not confirmed. [3] Includes 3 suspected cases reported week ended Mar. 25, 1950—not previously reported. [4] Reported in Azero Province during the period Jan. 1-Mar. 14, 1950, with 230 deaths. [5] Telegram dated May 6, 1950, 8 deaths

Regular Corps Examinations for Veterinarians

Examinations for veterinarians in the Regular Commissioned Corps of the U. S. Public Health Service will be held October 9, 10, and 11, 1950, in various cities throughout the country. Completed applications must be in the Washington Office by September 11, 1950.

Appointments are permanent and provide opportunities for career service in research in animal physiology, pathology, infectious and tropical diseases; in the veterinary aspects of public health, field investigation; and in food sanitation.

Appointments will be made in the grades of Assistant and Senior Assistant (equivalent to Army ranks of 1st Lieutenant and Captain, respectively). Entrance pay is $4,486 for Assistant (with dependents) and $5,346 for Senior Assistant (with dependents), including rental and subsistence allowance.

Applicants must have at least 7 years training and experience after high school, including graduation from an accredited school of veterinary medicine.

For application forms and additional information write to: Surgeon General, U. S. Public Health Service, Federal Security Agency, Washington 25, D C., Attention: Division of Commissioned Officers.

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